C – EDUCATION, EXTENSION AND INFORMATION

C10 - EDUCATION

Development and validation of scale to measure the knowledge of Filipino Barangay [Village] Nutrition Scholars on infant and young child feeding counseling. **Sacdalan-Africa, L. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Human Nutrition and Food. lsafrica@up.edu.ph., leila.sacdalan@ui.ac.id., Mansyur, M. Universitas Indonesia, Jakarta (Indonesia). Muslimatun, S. Indonesia International Inst. for Life Science (i3L)) Jakarta (Indonesia). Barba, C.VC.. World Bank Program, Manila (Philippines).** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 93-112. 2017.*

The Barangay (Village) Nutrition Scholars (BNS) has been trained to do infant and young child feeding (IYCF) counseling but the absence of a validated knowledge test instrument limited the practice of knowledge assessment and pose question if they know the correct information for their client. The purpose of the study was to develop a psychometrically sound measure for BNS knowledge assessment on IYCF counseling. True or false, fill-in- the-blanks and multiple-choice items were developed based on the training manual on IYCF counseling and other existing pre- and post-tests about this subject. An instrument with 38 items was pilot tested by a sample of 320 BNS. The item was increased to 47 through item analysis and was field-tested by a sample of 280 BNS. Exploratory factor analysis (EFA) using the pilot test data identified a two-factor model and 20 acceptable items for measuring recall and understanding. Confirmatory factor analysis (CFA) using the field test data supported the two-factor model (X2 (89) =97; p=0.27) but only with 15 acceptable items. Content validation using the study blue print necessitated the addition of seven meaningful items. Validity indices were adequate while internal consistency was desirable based on final analysis. The scale to measure knowledge of BNS on IYCF counseling is psychometrically sound and could be used to provide better judgments and explanation about the effectiveness of IYCF training and counseling, respectively.

INFANTS; INFANT FEEDING; NUTRITIONAL STATUS; STUDENTS; DIFFUSION OF INFORMATION

National Corn-based Farmer Scientists Research, Development and Extension Training Program (FSTP) under Executive Order 710:2020 annual report (January-December). **Davide, R.G., Valencia, G.Z., Velasco, W.S., Melodillar, C.O., Anuada, A.M., Jamias, A.F.B., Bequiillo, I.O., Parducho, M.A.L., Caindoy, J.M.I., Bungar, J.C.C., Talde, R.C., Cayabyab, B.A.G., Reyes, R.M. Philippines Univ. Los Banos, College, Laguna. Agricultural System Inst.**

Even with the challenges of the COVID-19 pandemic, the National Crop-based Farmer-Scientist RDE Training Program (FSTP) remains steadfast in fulfilling its mission to liberate poor farmers from the bondage of poverty and hunger. Despite the imposition of community quarantines and travel restrictions beginning March 2020, the Program had continuously reached out to farmers for them to continue gaining knowledge in the scientific way of farming. The importance of the agriculture sector was once again highlighted during the pandemic. Hence, empowering the famers in knowledge, attitude, and skills must not cease. FSTP, since its proclamation as Executive Order 710 in 2008, has provided small farmers from impoverished areas a direct training contact with agricultural experts and scientists. Through this, farmers gain technical and scientific knowledge to significantly improve their farm productivity and their socio-economic status. For the whole duration of the program under EO 710, FSTP has covered a total of 112 municipalities in 50 provinces from Regions 1 to 13. In 2020, 15 new project sites were launched in different provinces with six in Luzon, two in Visayas and seven in Mindanao. New provincial sites include: Abra; La Union; Nueva Vizcaya; Palawan; Biliran and Northern Samar. To realize more site expansions in 2020 and incoming years, the Regions 2, 3, 4A, 4B, 5, 8, 10, and 12 underwent Training of Trainers (TOT) to develop the technical and management capabilities of the partner-agencies, especially the provincial and municipal LGUs, SCUs, GOs and NGOs. During the community lockdowns, FSTP used distance learning platforms and video learning materials to continue to provide resources to and engage the farmers who are undergoing the training program nationwide. As for the trained farmer-scientists in 2020, a total of 357 farmer-scientists graduated in Phase 1 including the Phase 1 barangay-level the adopt a barangay components of FSTP. In Phase 2, a total of 12 farmer-scientists managed to conduct their own-farm trials and received their certificate of achievement. Lastly, in Phase 3, a total of 108 farmers became farmer-scientists teachers who shared their required knowledge to their respective communities. This is fewer compared to the previous years, but in the first quarter of 2021, their numbers will be beefed up with the graduation of around 400 FSTP-trained farmers.

FARMERS; TRAINING PROGRAMMES; FARMERS ASSOCIATIONS; AGRICULTURAL SECTOR; DIFFUSION OF INFORMATION

Predictors of agripreneurial intentions among agriculture students of state universities and college in Davao Region [Philippines]. **Manigo, B.I. University of Southeastern Philippines, Apokon, Davao del Norte (Philippines). Tagum-Mabini Campus.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 9. 2019.*

One of the most pressing challenges facing the Philippine agriculture is the ageing generation of farmers mainly due to various stereotypes about farming. Generally, people do not think of agriculture or farming as a profession making it less attractive for younger people, which consequently result to declining number of enrollees to agriculture courses. In addition, the country's agriculture sector receives the lowest average daily basic wage. One way to revitalize the country's agriculture sector and entice the young generation to engage in farming is through entrepreneurship in agriculture or agripreneurship. A study was conducted to predict the variables that influence the agripreneurial intentions of agriculture students of State Colleges and Universities (SUCs) in Davao Region [Philippines]. A quantitative descriptive research design was used utilizing a survey questionnaire to determine the likelihood of students to engage in agripreneurial activities five years after they graduate. The study administered 300 fourth year agriculture students from three state-run institutions in the region which were randomized following a stratified random sampling. The data gathered were summarized and interpreted using Binary Logistics Regression Analysis. Results showed that among the socio demographics, family agricultural land ownership reliably predicted agripreneurial intentions of students while the impact on other factors was insignificant. Furthermore, human behaviours such as attitude, subjective norms and perceived behavioural controls were found to significantly impact the decision of the respondents to engage in agripreneurship. It also appeared that creativity, problem solving and leadership and communication skills positively influenced agripreneurial intentions. These results provide useful idea in the academe to enhance the current design and teachings strategies to promote agripreneurship among its students.

EDUCATIONAL INSTITUTIONS; STUDENTS; HUMAN BEHAVIOUR; CURRICULUM; AGRICULTURE; PHILIPPINES

Storytelling: a disaster awareness tool among kindergarten pupils. **Tolentino, M.A., Vergara, H., Albor, R.G.S., Dy, M.F.R., Sanchez, R.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Human and Family Development Studies. Bulasag, A. Philippines Univ. Los Baños, College, Laguna (Philippines). Rural High School. Pelegrina, D.Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Human and Family Development Studies.** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 73-92. 2017.*
https://jhes.uplb.edu.ph/articles/storytelling-a-disaster-awareness-tool-among-kindergarten-pupils/

This study aimed to explore the effectiveness of storytelling as a disaster awareness tool in improving children's understanding of typhoons. The study probed into children's understanding of a typhoon in terms of knowledge of typhoon definition and effects; recognition of activities before, during and after a typhoon; definition of typhoon

occurrence; and identification of ways to give aid to typhoon victims. The Narrative Story Stem Technique was used to elicit responses to a sample of 37 kindergarten respondents from a private school in Laguna [Philippines]. A pre-test and post-test approach was administered to look into changes with children's knowledge on typhoons after the storytelling activity. Results of the comparison between the pre-test and post-test responses showed that children have little to no knowledge of typhoons before the storytelling activity. Likewise, results from the paired t-test revealed that the children's scores significantly increased after the storytelling activity. These findings provide preliminary evidence that storytelling can be an effective tool in teaching children about disaster awareness, particularly on typhoons.

STUDENTS; TEACHING METHODS; DIFFUSION OF INFORMATION; CYCLONES; DISASTERS

TQM/ISO [Total Quality Management/International Organization for Standardization] 9001 implementation in Northern and Central Luzon State Universities [Philippines]. **De Leon, P.C. Philippines Univ. Diliman-Extension Programme in Pampanga and Olongapo, Pampanga (Philippines). deleonpatrick2@gmail.com., pcdeleon@up.edu.ph.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 4 p. 81-107. 2017.*
https://jpad.cpaf.uplb.edu.ph/articles/tqm-iso-9001-implementation-in-northern-and-central-luzon-state-universities/

This case study was conducted to investigate why and how the TQM/ISO 9001 programs were adopted in state universities in the Philippines such as Pangasinan State University, Nueva Ecija University of Science and Technology, and Central Luzon State University; what TQM [Total Quality Management] and ISO [International Organization for Standardization] 9001 meant to them; and what factors affected TQM/ISO 9001 implementation in their universities. The study found that TQM/ ISO 9001 programs were intended to streamline work processes and improve the quality of services. Implementation involved the hiring of a consultant, conducting trainings, preparing and using a QMS manual, organizing internal and external audits, and receiving ISO 9001 certification from an international body. TQM was regarded as a holistic approach to the continuous improvement of work processes while ISO 9001 was perceived as an international QMS standard and a quality assessment instrument. The factors that positively affected TQM/ISO 9001 implementation were senior management commitment and/or the presence of a TQM driver; funds to operate; employee understanding and internalization; conduct of control procedures; and implementation reinforcement or complementation by the citizen's charter. Factors with negative effect were the employees' lack of commitment and discipline, and their resistance or inability to adapt to change. The study recommends programs that minimize resistance to and promote internalization of TQM/ISO 9001 adoption; and the creation of a

government certifying body that can serve as an alternative to the private international certifying bodies.

UNIVERSITIES; DEVELOPMENT PROJECTS; POLICIES; MANAGEMENT; MANPOWER; PHILIPPINES

C20 - EXTENSION

Binhing Palay App: Philippine modern rice variety catalouge App. **Caballong, N.L. nl.caballong@philrice.gov.ph., Alday, P.A.A. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 165-166. 2019.*

As of 2019, there are 289 modern rice varieties released to farmers and seed growers. Being the host of the national rice cooperative testing of newly-bred rice varieties, PhilRice manages the database of all available rice seed varieties developed by both private and public breeding institutions. This database contains information about potential yield, pest and disease resistance, recommended environment, milling grade, and sensory quality of rice varieties. Binhing Palay (BP) app was developed to deliver this rice variety database through smartphone and tablet devices. Farmers, extension workers, and researchers can filter and sort the list of all rice varieties depending on different categories using the BP app. They can be updated with varieties suited for different environments such as irrigated lowland, rainfed lowland, cool elevated, saline-prone and upland. They can filter information based on seed classification (inbred, hybrid, and special rice), agronomic characteristics (average yield, maximum yield, plant height), and grain quality attributes (amylase content, chalkiness, grain length). The app also offers location recommendation based on reports from DA regional offices, and farmer preferences on survey results. Moreover, a separate page displays the top varieties being promoted by DA and PhilRice. BP App automatically updates whenever a new variety is released through a web-based portal that can be updated by designated content administrator. The app also has an analytics program to monitor actual usage.

ORYZA SATIVA; VARIETIES; DATABASES; COMPUTER SOFTWARE; COMPUTER APPLICATIONS

Exploring the ICT preferences of personnel from agricultural extension organizations in the Northeastern Region of India. **Baruah, A. anushree.baruah@gmail.com., Mohan, G.M. Pondicherry Univ. (India). Dept. of Management Studies.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 18 (1) p. 105-120. 2011.*

https://ajad.searca.org/article?p=1456

Although the public extension system in India is known to be one of the largest in the world, it still lacks coordinated effort in managing the links between research, extension, and farmers, resulting in non-uniform distribution of agricultural knowledge and technology. A vast majority of the population earning their livelihood through agriculture remain small and marginal farmers. Lack of computerized networks in agricultural extension departments, inadequate skilled manpower for disseminating agricultural information, and increasingly diverse needs of farmers across the Indian sub-continent pose hurdles in effective information transfer to the farming community. The use of information and communication technology (ICT) tools exerts a positive impact on agriculture worldwide by aiding speedy and effective dissemination of agricultural information. Increased awareness of modern ICT tools and their usage will contribute substantially to strengthening the extension network and expand its scope. This study explored the ICT preferences of personnel from agricultural extension organizations employed in public extension organizations in the north-eastern region of India. It found that electronic media is ranked below the conventional extension contact modes of print media and personalized contact regarding its use for disseminating agricultural information by the extension personnel. Demographic characteristics of the personnel from agricultural extension organizations such as sex, age, education, specialization, designation, and work experience were significantly associated with the pattern of ICT use specifically experience with ICT, frequency of use, training, and voluntary use.

EXTENSION ACTIVITIES; DIFFUSION OF INFORMATION; ADVISORY OFFICERS; INFORMATION TECHNOLOGY; INDIA

Policy and institutional challenges in climate information services provisioning in Philippine agriculture. **Elazegui, D.D., Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. acrola@up.edu.ph., Luyun, R.A. Jr. Philippines Univ. Los Baños, College Laguna (Philippines). Coll. of Engineering and Agro-Industrial Technology. Anastacio, N.J.C., Faderagao. F.J.F., Alvarez, M.C.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 4 p. 51-79. 2017.* https://jpad.cpaf.uplb.edu.ph/articles/policy-and-institutional-challenges-in-climate-information-services-provisioning-in-philippine-agriculture/

Current and immediate information about the increasingly unpredictable weather conditions are needed to augment conventional knowledge in local communities. Policy analysis on climate information services (CIS) provisioning in the agriculture sector is vital and warranted. This paper describes the global and national CIS policies as well as the

institutions involved in provisioning through the characterization of pathways from data generation to dissemination. Further, it identifies the various intermediary users of the CIS and how CIS are ultimately disseminated to the municipal agricultural offices and the farmers. Secondary data sources were searched. Primary data were gathered through key informant interviews. Qualitative methods were used in the analysis. This paper concludes that the Philippines needs a better system to provide climate information through more modern technologies, improved capacities, and more stable institutional partnerships, among others. To sustain or bolster the provisioning of CIS, there must be compliance to standards in the establishment, use, and maintenance of the CIS equipment; improved capacities in the dissemination; and commitment of partners to institutionalize collaboration among the providers and the users of CIS.

CLIMATE; INFORMATION SERVICES; POLICIES; FARMERS; RURAL COMMUNITIES; DIFFUSION OF INFORMATION; AGRICULTURE; PHILIPPINES

Prolific millennial farmer finds further success in inspiring viewers on social media. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (1) p. 24-28. 2021.*
https://www.agriculture.com.ph/2020/11/15/prolific-millennial-farmer-finds-further-success-in-inspiring-viewers-on-social-media-part-1-from-farmer-to-agriculture-influencer/

FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; DIFFUSION OF INFORMATION; FARMS; RURAL AREAS; TOURISM; MASS MEDIA

Promoting Philippine indigenous vegetables through facebook: an analysis of communication process. **Bautista, N.J.L. nlbautista@up.edu.ph., indigenousvegetables,icrops@gmail.com., Sister, L.E., dela Cruz, N.J., Rabillos, C.D., Barrion, D.C.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Aguilar, C.H.M. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Altoveros, N.C., Borromeo. T.H., de Chavez, H.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Endonela, L.E. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Gentallan, P.P. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 177. 2019.*

Indigenous vegetables play an important part in the Philippines' culture and identity yet are still unfamiliar to those outside their regional niches. Facebook is a free-to-use social media platform that could inform more people about indigenous vegetables. Public since July

2018, 'Ang Gulay, Bow.' is a Facebook page that promotes the use of indigenous vegetables using primary data from selected communities in ten provinces and secondary sources from literature as well as shared Facebook posts that deal with indigenous vegetables. Analysis of the overall attention received by the page in its first few months of being public used the Diffusion of Innovation (DOI) theory and the Shannon-Weaver communication model. A small proportion of the total page 'likers' are the participants in the community meetings while the majority belongs to the social networks of the research team. A special case is a video featuring the documentation of indigenous vegetables in one village in Davao del Sur [Philippines] which amassed a significantly large number of 'views' and 'shares' from people outside the community meeting participants and the research team's networks. Overall, the active engagement of Facebook users of local influence garnered more traffic for the page. Whether Facebook can make a difference in the public's perception and consumption of indigenous vegetables remains to be seen. As a Facebook page devoted solely to sharing information on indigenous vegetables, 'Ang Gulay, Bow.' seems a good start.

VEGETABLE CROPS; INDIGENOUS ORGANISMS; DIFFUSION OF INFORMATION; TECHNOLOGY; TECHNOLOGY TRANSFER

Strengthening CLSU [Central Luzon State Univ., Philippines] technical experts on responsible rice pest management. **Garcia, V.C., Carbonel, R.R., Fernando, M.C.M., Abon, C.C. Jr., Sicat, E.V. Philippine-Sino Center for Agricultural Technology, CLSU Compound, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 178. 2019.*

The course aimed to enjoin the participants on using environment-friendly pest control to improve the yield results of hybrid rice seed production and cultivation at the Philippine-Sino Center for Agricultural Technology (PhilSCAT) and to capacitate the staff on correct pest identification and application of integrated crop management technologies during crop development. Specifically, it intends to develop the participant's technical competence on Integrated Pest Management and improve their decision-making in managing rice ecosystem to maintain the pest population below the damaging level. Also, the training hope to achieve at least 40% increase in the participants' knowledge of level, which is manifested in their Gain-in Knowledge (GIK). A total of 33 Central Luzon State University Technical Experts (CLSU) from different Centers participated in the training wherein 46% were from PhilSCAT, 18% from the CLSU-Research Office, 15% from Ramon Magsaysay Center for Agricultural Environment Studies, 12% from University Business Affairs Program (UBAP), and 9% from CLSU-Extension Office. Instructional strategies used in the training are (30%) participatory lecture-discussion to bring out issues and concerns and to encourage

active participation among trainees and (70%) field practicum and exercises to promote experiential learning and cognitive understanding of the concept or theory being introduced. Evaluating their performance, 92.3% positive increment was recorded based on the pre and post-tests of the participants. Majority of the participants said that they were satisfied with the training course and evaluated the overall rating of the course as excellent. The training was feed backed as commendable and the participants wanted to extend the training duration for more hands-on activities.

ORYZA SATIVA; HYBRIDS; SEED PRODUCTION; PEST CONTROL; TECHNOLOGY; TECHNOLOGY TRANSFER; TRAINING PROGRAMMES; DIFFUSION OF INFORMATION

Tracing the 2015 graduates of the Rice Boot Camp for Agriculture and Related Courses. **Bernardo, A.J.A. Philippine Rice Research Inst., Malasin, San Mateo, Isabela (Philippines). Isabela Branch Station. Tome, C.J.M.M. Central Luzon State Univ., 3120 Science City of Munoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 180. 2019.*

A tracer study involving the 2015 graduates of the Rice Boot Camp for Agriculture and Related Courses was conducted to determine the relevance of the training to the participants. Specifically, it aimed to determine the learnings gained from the training and how these learnings were applied or shared to others. The Rice Boot Camp was offered to new graduates of agriculture and related sciences to prepare them for their job. It focused on the PalayCheck System of rice production, enhancement of communication skills, and in the preparation of project concepts and proposals. The researcher tried to contact all the graduates using their email addresses and mobile phone numbers indicated in the directory of participants. Out of 25 graduates, 13 responded. Using a set of guide questions, data were gathered. Results showed that the graduates all benefited and learned much from the training. More than half of the respondents (69.2%) claimed that their learnings became very useful as they landed in agriculture-related jobs while others (30.8%) still claimed that they benefited because their oral communication and facilitation skills were enhanced as well as their social abilities. All respondents shared their learnings to others, especially their household members, rice farmers, and colleagues in their workplace. The respondents who landed in agriculture-related jobs said that their attendance to the Rice Boot Camp was an important factor during their job application and eventually their hiring. It is therefore concluded that the training was able to achieve its objectives and the conduct of a tracer study became an important tool in assessing the trainings' impact on the graduates.

AGRICULTURE; RICE; PRODUCTION; TRAINING; TRAINING COURSES; DIFFUSION OF INFORMATION; TECHNOLOGY TRANSFER

Transformative learning as a ground-up approach to sustainable development:narratives from Vietnam's Mekong Delta. **Nguyen Minh Quang. nmquang@ctu.edu.vn., Le Van Nhuong. lvnhoung@ctu.edu.vn., Ho Thi Thu Ho. httho@ctu.edu.vn., Le Van Hieu. lvhieu@ctu.edu.vn., Trinh Chi Tham. tctahn@ctu.edu.vn., Nguyen Thi Ngoc Phuc. Cantho Univ. (Vietnam). ntnphuc@ctu.edu.vn.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 16 (2) p. 97-117. 2019.*
https://ajad.searca.org/article?p=1039

As the Vietnamese government continues to seek appropriate actions to move the national action on climate change forward, the emergence of grassroots sustainability initiatives has the potential to promote sustainability from the ground up. This paper reviews the current concepts of transformative learning (T-learning) and its importance through which some substantial linkages between T-learning and sustainability can be identified. It outlines the environmental changes in Vietnam's Mekong Delta, which appear to serve as 'disorienting dilemmas' that force the local people to learn and gradually transform their behaviors and lifestyle choices to align with a low carbon and sustainable development. In an ideal T-learning approach, the major beneficiaries are the small-scale farmers, women, and ethnic groups (learners). They learn by doing under the supervision of educators (experts) in field-based schools that offer real-life experience and encourage learners to shift from traditional farming practices to modern, eco-friendly agricultural models that promote local economic self-reliance and biodiversity conservation. The paper sheds new light on how a critical approach to education for sustainable development through T-learning is an appropriate form and why T-learning should be acknowledged as an important part of the broader approach to self-help, climate resilient development in vulnerable communities.

EDUCATION; EXTENSION ACTIVITIES; MANGROVES; PRAWNS AND SHRIMPS; FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; INDIGENOUS KNOWLEDGE; FARMERS; VIET NAM

Trending rice: communicating agri information on social media. **Nidoy, M.G.M. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Development Communication Div. Manuel, F.G. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Community Relations Office. Baliwag, A.C. Jr. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Development Communication Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific

Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 180. 2019.*

While there has been a good number of studies on using mass media in disseminating agricultural information, there is a dearth of scholarship on social media in relation to agriculture. This study aimed to explore the strategies on using social media in communicating rice science, with the Philippine Rice Research Institute (Phil Rice) Facebook Page as the case study. Based on Facebook analytics, posts on seeds and varieties consistently generate higher number of reach. Hence, this topic was used in this study to test different platforms to communicate rice science from July 30 to August 31. Comments were responded within 24 hours, and these comments were used for analysis of the interaction among users of PhilRice Facebook Page. Data gathered show that top five most effective platforms were photos, infographics, features, KP ad, and videos with total number reach of 140, 215. Most of the comments were cognitive, attitudinal, and behavioral. As a recommendation, type of media, topic, caption, and timeliness are some of the important strategies that communicators in social media should pay attention to for a more effective delivery of information.

RICE; AGRICULTURE; TECHNOLOGY; DIFFUSION OF INFORMATION; MASS MEDIA; TECHNOLOGY

Wireless Sensor Network platform for real time-rice and environment monitoring. **Quierra, P.J.S., Caballong, N.L. nl.caballong@philrice.gov.ph., Dicen, E.M. III., Alday, P.A.A., Tallada, J.G., Barroga, R.F., Fenangad, D.B. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 181. 2019.*

This paper presents a Wireless Sensor Network (WSN) platform that can be used by researchers to continuously gather parameters from spatially distributed sensor nodes in the rice field and view data real-time in their desktop computer. WSN is a product of advances in the development of low-cost sensing devices, open-source electronics, and wireless network technologies. It is a system of wirelessly connected nodes that electronically gathers parameters through applicable sensors. Each node serves as a bridge relay to allow far nodes transmit data to a central coordinating node which then sends data to an on-site or remote central database. Nine wireless nodes comprising solar energy module, open source microcontroller, and sensors were deployed strategically in a 5-ha farm. Seven nodes with temperature and humidity sensors were placed on rice paddy plots, and two nodes with temperature, humidity, water conductivity, and pH sensors were

positioned in the aquaculture ponds. They were all connected wirelessly via ZigBee network protocol. Data gathered by the sensing nodes are automatically collected towards a coordinating node that sends data over PhilRice's local area network to a database server. A webpage was developed to display all data captured by the system. Other relevant sensing devices can be connected to each sensing node. Moreover, new wireless sensing nodes deployed in the farm can easily connect to the WSN given the right credentials.

RICE; ENVIRONMENT; MONITORING; SENSORS; DIFFUSION OF INFORMATION; TECHNOLOGY; TECHNOLOGY TRANSFER

C30 - DOCUMENTATION AND INFORMATION

Literature mining on dipterocarps: towards better informed natural regeneration and reforestation in Luzon, Philippines. **Gabud, R.S., Batista-Navarro, R.T. Philippines Univ. Los Baños College, Laguna (Philippines). Inst. of Computer Science. Mariano, V.Y. Royal Melbourne Inst. of Technology Univ., Ho Chi Minh City (Vietnam). Mendoza, E.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Yap, S.L. Far Eastern Univ., Manila (Philippines).** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 29 (2) p. 39-53. 2019.*
https://erdb.denr.gov.ph/2020/05/01/sylvatrop-volume-29-no-2-july-to-december-2019/

Access to comprehensive information is critical in Natural Resource Management (NRM). While information resources largely shape the decision-making process of conservation policy regulators, significant barriers could present themselves at any point along the NRM information supply pipeline. Similarly, these barriers could appear in the management of the natural regeneration and reforestation of lowland dipterocarp forests in the Philippines, Moreover, the supra-annual mass flowering of dipterocarps occurs in irregular intervals, thus predicting the likelihood of their natural regeneration, to subsequently make plans for reforestation is an extremely complex task. This study aimed to address information gaps by utilizing text mining, which is the automatic process of extracting structured information from documents such as scientific publications, books, and agency reports. The results were based on a preliminary version of the annotated document collection or corpus. The reliability of the corpus was determined by inter-annotator agreement (IAA). Satisfactory IAA was obtained for taxon and geographic location concept types with 90.35% and 93.82% F-scores, respectively. This corpus could provide NRM policy-makers with a searchable database on the distribution and mass flowering of Philippine dipterocarps for dipterocarp species regeneration and reforestation.

DIPTEROCARPACEAE; REFORESTATION; DATA PROCESSING; ACCESS TO INFORMATION; DATA ANALYSIS; DATA PROCESSING; PHILIPPINES

Taking stock of bamboo resources in three key productions areas and implications for the Philippine bamboo industry. **Razal, R.A. Philippines Univ. Los Banos, College, Laguna (Philippines). Dept. of Forest Products and Paper Science. Malabrigo, P.L. Jr. Philippines Univ. Los Banos. Dept of Forest Biological Sciences.** UPLB Centennial Professorial Chair Lecture. Via online (Zoom meeting platform). 9 Jun 2021.

This lecture paper deals with the inventory of bamboo resources and how it could lead to creating a more conducive business environment for the Philippine bamboo industry. It is concerned with the sustainability of bamboo resources to meet the anticipated demand for bamboo poles for traditional and emerging uses and industries based on bamboo. Determining how much bamboo is available for manufacturing bamboo products is critical to justify investments. The gap in information pertaining to available bamboo resources can be doom efforts in creating a more investment-friendly environment, if manufacturers cannot be ascertained of a sustainable supply of bamboo materials to feed their factories. This paper fills the need for a system that will yield an accurate and up-to-date information about the availability of bamboo in various parts of the country. It describes efforts to develop a system of bamboo inventory based on trials in three selected key bamboo production areas, namely, Pangasinan, Iloilo, and Bukidnon [Philippines] provinces. The development of a community-based inventory system, which entailed the initial preparation of community maps that showed the physical availability of bamboo in the key production areas, is described. The maps were digitized and validated in the field. Community partners were trained on inventory methods and on the proper identification several bamboo species. The final outputs were GIS-based distribution maps and a database for bamboo resources in the key production areas. Overall, a total coverage of 20,336 has of land planted with bamboo was projected, along with 2,655,332 harvestable bamboo culms from the three provinces. Nomenclatural ambiguity of bamboo, i.e., differences in names depending on location, were also addressed. A draft policy instrument was also formulated, for possible presentation to key stakeholders for validation and adoption.

BAMBOOS; SURVEYS; GEOGRAPHICAL INFORMATION SYSTEMS; DATABASES; DATA PROCESSING

Wireless Sensor Network platform for real time-rice and environment monitoring. **Quierra, P.J.S., Caballong, N.L. nl.caballong@philrice.gov.ph., Dicen, E.M. III., Alday, P.A.A., Tallada, J.G., Barroga, R.F., Fenangad, D.B. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 181. 2019.*

This paper presents a Wireless Sensor Network (WSN) platform that can be used by researchers to continuously gather parameters from spatially distributed sensor nodes in the rice field and view data real-time in their desktop computer. WSN is a product of advances in the development of low-cost sensing devices, open-source electronics, and wireless network technologies. It is a system of wirelessly connected nodes that electronically gathers parameters through applicable sensors. Each node serves as a bridge relay to allow far nodes transmit data to a central coordinating node which then sends data to an on-site or remote central database. Nine wireless nodes comprising solar energy module, open source microcontroller, and sensors were deployed strategically in a 5-ha farm. Seven nodes with temperature and humidity sensors were placed on rice paddy plots, and two nodes with temperature, humidity, water conductivity, and pH sensors were positioned in the aquaculture ponds. They were all connected wirelessly via ZigBee network protocol. Data gathered by the sensing nodes are automatically collected towards a coordinating node that sends data over PhilRice's local area network to a database server. A webpage was developed to display all data captured by the system. Other relevant sensing devices can be connected to each sensing node. Moreover, new wireless sensing nodes deployed in the farm can easily connect to the WSN given the right credentials.

RICE; ENVIRONMENT; MONITORING; SENSORS; DIFFUSION OF INFORMATION; TECHNOLOGY; TECHNOLOGY TRANSFER

D - ADMINISTRATION AND LEGISLATION

D50 - LEGISLATION

Assessment of the Free Irrigation Service Act. **Briones, R.M. Philippine Inst. for Development Studies, 18th Floor, Three Cyberpod Tower, Centris-North Tower, EDSA corner Quezon Ave, Quezon City (Philippines). Clemente, R.S. Department of Science and Technology, Bicutan, Taguig City (Philippines). Inocencio, A.B. De La Salle Univ., 2401 Taft Ave., Manila (Philippines). School of Economics. Luyun, R.A. Jr Philippines Univ. Los Baños, College, Laguna (Philippines). Land and Water Resources Div. Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development.** *PIDS [Philippines Institute for Development Studies] (Philippines) Research Paper No. 2020-5. Reseasch Paper No. 2020-5. 1908-3297; 2508-0830. 35 p. 2020.*
https://www.pids.gov.ph/publication/research-paper-series/assessment-of-the-free-irrigation-service-act

The country's irrigation systems have a long history of recovering maintenance cost from farmers. The Free Irrigation Service Act (FISA) of 2018 was a radical departure from this

policy. This study is a preliminary assessment of the policy change through an examination of secondary data and collection of primary information through key informant interviews and focus group discussions. The study found that the free irrigation had the potential to benefit millions of individuals, although it only led to a small savings in palay production cost. Moreover, while palay farmers were poorer than the average household, most palay farmers were not poor. Group interviews with farmers and staff from the National Irrigation Administration (NIA) confirmed that the main benefits to farmers of free irrigation was their savings from paying irrigation service fees (ISF). The shift to free irrigation also addressed some of the distort ions associated with cost recovery among national irrigations systems (NIS), such as understatement of irrigation service area and time allocation irrigation created a new regime of incentive with inclear implications to the behavior of NIA staff and irrigators' associations. For instance, farmers may become less demanding of the quality of irrigation service or the usefulness of an irrigation project. The funding for the operation and maintenance of NIS has also declined under the free irrigation policy. While a new funding channel has been opened for communal systems, the level of the operations and maintenance in these systems were constrained by the low level of subsidy and increased difficulty in collectin g contributions from the members of irrigators' associations. The study urges the government to continue pursuing irrigation management transfers within the con text of free irrigation based on minimum maintenance for NIA and transparent maintenance standards for both NIA and irrigators' associations. It also calls for a sustained and increasing subsidy for operations and maintenance (Q and M), which must be made available only in a performance basis. The government may also explore water saving as a performance criterion for subsidy for Q and M. This study advocates for the transformation of NIA into a service-providing agency specializing in technical assistance to irrigators' associations, contract design, and performance monitoring. Lastly, it recommends for the introduction of a mandatory review comparing the FISA with other social assistance and protection schemes in achieving equity objectives.

LEGISLATION; IRRIGATION; IRRIGATION SYSTEMS; GOVERNMENT; FARMERS

E - AGRICULTURAL ECONOMICS, DEVELOPMENT AND RURAL SOCIOLOGY

E10 - AGRICULTURAL ECONOMICS AND POLICIES

Adaptation of the food insecurity experience scale (FIES) for measuring food insecurity among women in socially-backward communities. **Onori, F. Sapienza Univ . of Rome, Rome (Italy). Dhillon, P. International Inst. for Population Science, Mumbai (India). Dinachandra, K. Lady Irwin Coll., New Delhi (India). Jaleel, A., Saraswat, A., Reshmi R.S., Unisa, S. International Inst. for Population Science, Mumbai (India). unisa@iips.net., Sethi, V.**

UNICEF India Country Office, New Delhi (India). Nutrition Section. *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 18 (1) p. 65-82. 2021.*
https://ajad.searca.org/article?p=1382

Recent reviews on the use of experience-based food insecurity scales in the Indian context suggested the addition of 'how often' related items to food insecurity modules to avoid overestimation of food insecurity, especially in underprivileged communities. Following this recommendation, we adapted the 8-item Food Insecurity Experience Scale (FIES), an official tool for measuring access to food within the Sustainable Development Goals (target 2.1), and assessed its validity and reliability in socially-backward communities in the Indian context. The polytomous Rasch model was successfully applied and soundly integrated within the probabilistic methodology already in use for the FIES, allowing the computation of comparable prevalence of food insecurity at different levels of severity and related measures of uncertainty. Data from the SWABHIMAAN programme survey, which collected information on food insecurity from mothers of children under two years of age in three Indian states (Bihar, Odisha, and Chhattisgarh), was used for analysis. Results suggest that the proposed adapted version of the FIES can be considered as a proper tool for measuring food insecurity in underprivileged communities, since it satisfies requirements of internal and external validity and reliability. Individual determinants and protective factors of food insecurity were also investigated within this methodological framework and results suggest that education, economic wealth, and homestead kitchen garden can act as a buffer against food insecurity, while the number of pregnancies seems to exacerbate a situation of food insecurity.

FOOD POLICIES; FOOD SECURITY; ADAPTATION; WOMEN; RURAL COMMUNITIES; INDIA

Agricultural households' food demand: evidence from Indonesia. **Faharuddin. Badan Pusat Statistik, Jakarta (Indonesia). fahar@bps.go.id., Yunita. yunita.sep.unsri@gmail.com., Mulyana, A. andy.sep.unsri@gmail.com., Yamin, M. Sriwijaya Univ., (Indonesia). yaminsepunsri6@gmail.com.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 16 (2) p. 45-60. 2019.*
https://ajad.searca.org/article?p=927

This study analyzes the consumption patterns of agricultural households in Indonesia using the 2013 first quarter data of the Indonesian National Socioeconomic Survey (Survei Sosial Ekonomi Nasional [Susenas]) and the quadratic almost ideal demand system (QUAIDS) approach. Indonesian households' food expenditure is mostly on rice, vegetables, and fish. Rice expenditure is a top priority particularly in agricultural household spending in Indonesia. Agricultural households consume more calories and carbohydrates, but less protein and fat, than nonagricultural households do. The expenditure elasticities of

agricultural and nonagricultural households are significantly different only in the following commodities: milk, other foods, meat, fruits, and rice. The differences in the price elasticities of the two household groups are found in non-rice staple, other foods, rice, and milk. The expenditure elasticity of nutrients of agricultural households tend to be higher.

HOUSEHOLDS; FOODS; FOOD CONSUMPTION; CONSUMER EXPENDITURE; PRICE ELASTICITIES; INDONESIA

Community participation in the local rice security programs in Cailaco and Maliana sub-districts in Timor-Leste. **Martin, M.S.D.S. Youth for Change Program, Deutche Gesellschaff fur Internationale, Zusammenarbeit Gmbtt, Dili (Timor Leste). Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. jtdizon@up.edu.ph.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 4 p. 1-27. 2017.*
https://jpad.cpaf.uplb.edu.ph/articles/community-participation-in-the-local-rice-security-programs-in-cailaco-and-maliana-sub-districts-in-timor-lest/

This study was conducted to analyze the factors affecting community participation in the rice security programs in Cailaco and Maliana, Timor-Leste in 2015. Respondents were 103 farmer-members randomly selected from seven farmer groups who worked in the rice programs. Socio-demographic and economic characteristics of the farmers were gathered. Primary data were collected using a structured survey questionnaire, supplemented with data from key informant interviews and focus group discussions. Secondary data were collected from government institutions and donor agencies. Results of the study show that farmers in Cailaco and Maliana have a mean age of 44 years. They have been farming for about 20 years and members of farmers' group for four years. They have an average farm size of 2 ha with two parcels used for farming. They have very favorable attitude toward joining farmers' groups and very high trust toward co-farmers and farmers' group. Using binary logistic regression, results show that the farmers were fully involved from project identification, planning, implementation, and up to monitoring and evaluation. It also reveals the socio-economic factors that affected the respondents' participation in the different phases of the programs. Year of membership in farmers' group and trust in co-farmers significantly affected problem identification. Household size, adequate income for family support, and year of membership in farmers' group affected planning; age and financial resources were related to implementation; and age affected monitoring and evaluation.

RICE; FOOD SECURITY; FOOD SUPPLY; FARMERS; SOCIAL PARTICIPATION; TIMOR-LESTE

Decentralization, the internal revenue allotment, and shared growth: an examination of correlations. **Maguito, F.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. cmaquito@up.edu.ph.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 4 p. 109-142. 2017.*
https://jpad.cpaf.uplb.edu.ph/articles/decentralization-the-internal-revenue-allotment-and-shared-growth-an-examination-of-correlations/

This is a macro study on the role of internal revenue allotments in decentralization to help the Philippines achieve shared growth. The research attempted to answer two interrelated development policy questions: 1) has the Philippines achieved shared growth; and 2) does the Internal Revenue Allotment (IRA) have the potential of contributing to shared growth? Patterns of correlation were distilled from available provincial as well as national data on average income, poverty incidence, income distribution, and IRA. Correlation analysis for the second question was supplemented with an analysis of the IRA formula. Results showed that growth in the Philippines has been more of the inclusive than the shared growth type. Moreover, research article tendered arguments against two criticisms of the IRA formula, thereby effectively revealing the potential of the IRA to contribute to shared growth. Recommendations were given for future research on crucial causalities, for example, among IRA, per capita income, population growth through internal migration, as well as the causalities underlying the dynamics among average income, poverty incidence, and income distribution.

DECENTRALIZATION; INCOME DISTRIBUTION; ECONOMIC GROWTH; POVERTY; PHILIPPINES

Feasibility and financial viability study of an intensive mustard-mungbean-transplanted aus rice-transplanted Aman Rice cropping system in a non-saline ecosystem of Bangladesh. **Islam, M.S. Bangladesh Agricultural Research Inst., Bhola (Bangladesh). On-Farm Research Div. Hossain, A. Bangladesh Wheat and Maize Research Inst., Dinajpur 5200 (Bangladesh). tanjimar2003@yahoo.com., Timsina, J. Institute for Studies and Development Worldwide, 8/45 Henley Rd., Homebush West, Sydney, NSW 2140 (Australia). timsinaj@hotmail.com., Saif, H. Bangladesh Agricultural Research Inst., Bhola (Bangladesh). On-Farm Research Div. Sarker, M.M.R. barimamun@yahoo.com., Khan, A.S.M.M.R., Hasan, M.K., Zahan, T. On-Farm Research Div., BARI, Gazipur (Bangladesh). Sabagh, A.E. Kafrelsheikh Univ., Kafrelsheikh (Egypt). Dept. of Agronomy. aymanelsabagh@gmail.com., Akdeniz, H. Igdir Univ., Ziraat Fakultesi, Tarla Bitkileri Bolumu (Turkey). hakki_akdeniz@hotmail.com., Barutcular, C. University of Cukurova (Turkey). Department of Field Crops. cbarutcular@gmail.com.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 73-83. 2020.*

Even as Bangladesh has achieved remarkable progress in food production, especially rice production, there is growing concern about how to feed its increasing population in the future since natural resources such as agricultural land and water are shrinking and undergoing degradation due to climate change. With the country's limited agricultural land area, horizontal expansion from crop production is hardly possible; on the contrary's vertical expansion is possible through increase in crop yield per unit area and reduction of production losses. Such expansion is only possible in the non-saline coastal areas where overall cropping intensity is lower compared with other parts of the country. To test this hypothesis, an experiment was conducted in a non-saline coastal ecosystem of Bangladesh on 2015-2016 and 2016-2017 to evaluate the feasibility and financial viability of a four-crop-based cropping pattern, i.e., Mustard-Mungbean-T. Aus-T.Amanagainst the farmers' three-crop-based pattern 'Mustad-Dibbling Aus-T.Aman'. After 2 yr, it was observed that the improved cropping pattern produced 19.4 t/ha of rice equivalent yield compared to only 10.7 t/ha in the farmers' cropping pattern. Land use efficiency and production efficiency in the improved cropping patterns were 94.3% and 36.8 kg/ha/d, respectively, compared to only 79.7% and 28.3 kg/ha/d in the farmers; cropping pattern. Gross margin in the improved cropping pattern was 1914 US$/ha whereas it was 924 US$/ha in the farmers' cropping pattern. The marginal benefit cost ration of the four-crop-based cropping pattern was 2.38 over the farmers' cropping pattern. In both patterns, there was negative apparent nutrient balance for K but positive balances for N and P. Based on productivity and economic returns, the study suggests that the improved four-crop-based cropping pattern is feasible and financially viable in the non-saline coastal zone of Bangladesh. These results will also have implications for the adjacent coastal ecosystems in India.

MUNG BEANS; MUSTARD; ORYZA SATIVA; CROP YIELD; SUSTAINABILITY; CROPPING SYSTEMS; CROP MANAGEMENT; FOOD PRODUCTION; ECONOMIC ANALYSIS; COST BENEFIT ANALYSIS; FEASIBILITY STUDIES; BANGLADESH

Impact of COVID-19 pandemic on agriculture production in Southeast Asia: reinforcing transformative change in agricultural food systems. **Gregorio, G.B. Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Ancog, R.C.** *SEARCA Policy Paper (Philippines). v. 2020 (1) p.1-12. 2020.*
https://www.searca.org/pubs/briefs-notes?pid=468

AGRICULTURE; PRODUCTION; FOOD SECURITY; VIROSES; ECONOMIC GROWTH; SOUTH EAST ASIA

Income inequality of oil palm plasma farmers in South Sumatra, Indonesia. **Ngadi. The Indonesian Inst. of Sciences, Jakarta (Indonesia). Research Center for Population.**

ngadi74@gmail.com. *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 16 (2) p. 61-72. 2019.*
https://ajad.searca.org/article?p=1021

One of the critical policies to encourage oil palm development in Indonesia is the Nucleus Estate Smallholders Project. This project involves engaging farmer organizations in operating and managing oil palm plantations. However, there are gaps in the organizational performance of plasma farmer cooperatives, which consequently affect oil palm productivity and farmers' welfare. This paper analyzes the income gaps among oil palm plasma farmers who are associated with state and private companies in Musi Banyuasin regency, South Sumatra, Indonesia. The results of the analysis show that the income of plasma farmers from the private company is higher than that of the state company plasma farmers. The type of nucleus company has a significant effect on the plasma farm households' income due to the differences in the organizational performance of the private- and state-sponsored cooperatives and the differences in the nucleus-plasma farmer relations. The cooperative that operates in a private company performs well, whereas the cooperative in a state company has ceased its operations. This research also found out that the number of household working members, income share from oil palm production, and land area have significant effects on the income of plasma farm households.

OIL PALMS; FARMERS; LABOUR; INCOME; HOUSEHOLDS; SMALL FARMS; INDONESIA

Increasing crop production benefits to small producers in Bangladesh. **Bryan, E. e.bryan@cgiar.org., Ringler, C. International Food Policy Research Inst., Washington, D.C. (USA). c.ringler@cgiar.org., Bell, A.R. New York Univ., New York, NY 10012 (USA). ab6176@nyu.edu., Ahmed, A.U. International Food Policy Research Inst., Washington, D.C. (USA). a.ahmed@cgiar.org.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 15 (1) p. 1-22. 2018.*
https://ajad.searca.org/article?p=610

Agricultural production in South Asia is characterized by intensive use of inputs, such as fertilizers and irrigation water, and by a focus on production of staple crops, especially rice. However, continued growth of the agriculture sector is hampered by a number of challenges. In Bangladesh, these challenges include declining productivity of inputs, resource degradation, and lack of crop diversification. Expansion of agricultural lands is not an option given high population density. Rather, greater efficiency in agricultural production is needed to increase benefits to small producers. This paper examined the benefits of key crop production decisions for rural livelihoods across Bangladesh in order to suggest ways in which producers can increase returns to crop production. The study used plot-level data from a household survey to estimate the relative contribution of various inputs and

practices to the total value of production from a given plot over the course of one year. Results were run separately for upper and lower expenditure quintiles to compare production outcomes for richer and poorer households. Three key results emerged: (1) that urea subsidies yielded benefits, though these might not be reaching those that needed it most; (2) that access to groundwater resulted in better production outcomes than access to surface water; and (3) that returns were greater from plots where rice was rotated with other crops.

CROPS; PLANT PRODUCTION; FERTILIZERS; IRRIGATION; FARM INPUTS; ECONOMIC ANALYSIS; BANGLADESH

Institutional resiliency: traditional rural labor institutions and rural industrialization in two Philippine villages. **Datoon, R.F. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Social Development Services.** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 128-144. 2017.*

This study examined why traditional labor institutions change and remain resilient in two farming villages in the Philippines with the establishment of a special economic zone (SEZ) in the area. The study focused on the institution of hunusan in rice harvesting. Specifically, this paper aims to describe the importance and benefits of traditional labor institutions, identify possible factors for change and resiliency and illustrate some implications. This study utilized both qualitative and quantitative methods as data were gathered through surveys, key informant interviews and field observations. The establishment of a SEZ in the town of Mariveles resulted in the diversification of livelihoods and increased preference of laborers to work in construction and SEZ, which, in turn, resulted to the difficulty of finding farm laborers, changes in farming practices, preference to be paid in wages and changes in traditional labor institutions in the villages. This study argues that traditional institutions provide benefits and can be resilient by accommodate changes. This is contrary to the view that such institutions are automatically replaced by market-based exchanges with industrialization and modernization. This study suggests that the resiliency of traditional institutions depends on their ability to reduce the risks and provide returns to people and in their ability to adjust with the changing economic environment without changing its underlying norms.

RURAL AREAS; INDUSTRIALIZATION; LABOUR; ECONOMIC ENVIRONMENT; PHILIPPINES

Measuring the efficiency of rice production in Myanmar using data envelopment analysis. **Linn, T. Yezin, Agricultural Univ. Nay Pyi Taw (Myanmar). dr.thuzarlinn@yau.edu.mm., Maenhout, B. Ghent Univ., Gent (Belgium). broos.maenhout@ugent.be.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 16 (2) p. 1-24. 2019.*

https://ajad.searca.org/article?p=1035

Rice production in Myanmar is constrained by biophysical and socioeconomic factors. Nonetheless, efficient farm practices can enhance productivity, farmers' profit, and the price and quality of marketed rice. This study analyzed the profitability and efficiency of rice production in the Ayeyarwaddy Region of Myanmar and identified the influencing socioeconomic characteristics and farm-specific characteristics. Primary data from 130 randomly sampled farmers in the Ayeyarwaddy Region were collected. Data were analyzed using descriptive statistics, data envelopment analysis (DEA), and Tobit regression analysis. According to the average overall technical efficiency, farmers have an additional rice yield potential of 25 percent that can be attained by improving input utilization. The best practices benchmarked in the region showed that technical inefficiency is caused by excessive use of inputs, especially herbicides and animal power. Most rice farms in this study suffer from allocative and economic inefficiencies resulting from wrong combinations of input usages. The average economic efficiency level indicates that farmers can increase their profitability by 57 percent if they adapted to reduce input costs. Moreover, efficiency was significantly higher for farmers who were younger, better educated, more experienced, had access to agricultural extension services, and cultivated the Aye Yar Min variety. Efficiency can be improved by setting up farmers' cooperatives to increase the scale of operations. Moreover, the government should intervene to reduce input prices, control the quality of input seeds, and install an appropriate financial crop insurance mechanism. Effective and systematic agricultural extension services should be widespread to improve the efficiency and decision-making skills of rice farmers in the study area.

ORYZA SATIVA; RICE; PLANT PRODUCTION; EFFICIENCY; PRICES; FARM INPUTS; FARMERS; ECONOMIC ANALYSIS; MYANMAR

Measuring the performance of communal irrigation systems in Bohol, Philippines. **Alegado, J.L.G. University of San Carlos, Cebu City (Philippines). jgalegado@up.edu.ph., Pabuayon, I.M. impaubayon@up.edu.ph., Catelo, S.P., Camacho, J.V. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). jvcamacho1@up.edu.ph.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 16 (2) p. 25-43. 2019.*
https://ajad.searca.org/article?p=1045

This study aims to measure the performance of communal irrigation systems (CIS), using cropping intensity and farm yield as indicators. In particular, the study focused on the importance of collective action and how it affects the performance of CIS as a form of irrigation system in the Philippines. The unit of analysis used is the irrigators' association (IA) that manages a CIS across the province of Bohol, Philippines. Analysis of variance was used to determine whether there are significant differences in the performance indicators

among the three IA classifications. Likewise, Tobit analysis and ordinary least squares estimation method were used to determine the significant factors that influence cropping intensity and farm yield as performance indicators. The results showed that excellent-rated associations have significantly higher cropping intensity and farm yield than the satisfactory- and fair-rated associations. With respect to the determinants of the performance indicators, labor contribution as a proxy of collective action, has a positive and significant influence on the performance of the irrigation system. Likewise, farm size and farm location have significant and positive effects on cropping intensity and farm yield. However, firmed-up service area and age of the association is statistically significant in farm yield only. To improve the performance of CISs, the study recommends that both monetary and labor contributions must be promoted among farmer-members of each IA.

FARMS; YIELDS; IRRIGATION SYSTEMS; ECONOMIC ANALYSIS; PHILIPPINES

Productivity and competitiveness of garlic production in Pasuquin, Ilocos Norte, Philippines.
Mina, C.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Cooperatives and Bio-Entreprise Development. Catelo, S.P., Jiminez, C.D. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Dept. of Agricultural and Applied Economics. csmina@up.edu.ph.
Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 18 (1) p. 49-63. 2021.
https://ajad.searca.org/article?p=1264

A total of 124 garlic farmers were selected and interviewed to evaluate the productivity and competitiveness of garlic farming in Pasuquin, Ilocos Norte, Philippines. The Technical efficiency (TE) was estimated using a stochastic frontier analysis or SFA based on the Cobb-Douglas production functional form, while the competitiveness of local garlic production was determined based on the ratio between import parity price and domestic resource cost ratio. The mean TE was 81 percent while the estimated gamma value was 0.92. These values indicate that 92 percent of the variation in garlic output is due to inefficiency factors and that total garlic output can further be increased with efficient use of resources. The analysis further revealed that seed rate and insecticides were statistically significant production factors. The results also show that group membership, farm size, and distance to the farm-to-market road (FMR) were statistically significant. Inefficiency factors and distance to the FMR have positive relationships while group membership and farm size have negative relationships with the garlic output. Price and cost ratios show that garlic from Pasuquin, Ilocos Norte could not yet compete with imported garlic from China in 2018. However, simulations show that if the Philippines can increase its national average by at least 20 percent (4.08 mt/ha), it can have a competitive advantage in garlic production. The results of the analyses highlight the need to revisit the output and input policies and programs of the government to increase the productivity and competitiveness of garlic

farming in Ilocos Norte. These programs include investing in quality seed, joining farmers' organizations, and providing better farming infrastructure.

PHILIPPINES; ALLIUM SATIVUM; GARLIC; PRODUCTIVITY; ECONOMIC COMPETITION; EFFICIENCY; PRICES; COSTS; PRODUCTION FUNCTIONS

Technical efficiency and social capital in tilapia aquaculture production in Nueva Vizcaya, Philippines. **Jandoc, A.M. Nueva Viscaya State Univ., Bayombong, Nueva Viscaya (Philippines). aljanetjandoc@yahoo.com.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 16 (2) p. 73-96. 2019.*
https://ajad.searca.org/article?p=881

This paper focuses on tilapia aquaculture production in Nueva Vizcaya, Philippines. Primary data were collected from a field survey. Apart from investigating the effects of technical efficiency variables (e.g., operator's experience, age of fishpond owner, and frequency of visits of the manager) on the production frontier, this study also incorporated social capital variables (e.g., social network and trust) as additional factors affecting the frontier. A cross-sectional analysis of 202 fishpond operators from the 10 municipalities in the province was conducted using stochastic frontier analysis, where the error component consists of both the usual two-side random shocks and the one-side technical inefficiency shocks. Results suggest that social network has an indirect but significant relationship to aquaculture harvest. On the other hand, harvest is significantly influenced by community trustworthiness, which implies that fish farmers who do not readily lend money to members of their community are able to increase their harvest because they can devote their funds to production activities.

TILAPIA; AQUACULTURE; EFFICIENCY; CAPITAL; ECONOMIC ANALYSIS; MATHEMATICAL MODELS; PHILIPPINES

E11 - LAND ECONOMICS AND POLICIES

Mapping risk of landslide at A Luoi District, Thua Thien Hue Province, Vietnam by GIS-based multi-criteria evaluation. **Linh, N.H.K. Hue Univ., Hue City (Vietnam). nguyenhoangkhanlinh@huaf.edu.ph., Degener, J. Goettingen Univ., Goettingen (Germany). jan.degener@geo.uni-goettingen.de., Ngoc, N.B. nguyenbichngoc@huaf.edu.vn., Chau, T.T.M. Hue Univ., Hue City (Vietnam). tranthiminhchau@huaf.edu.vn.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 15 (1) p. 87-105. 2018.*
https://ajad.searca.org/article?p=746

The study was conducted to determine the weight of factors influencing landslides through the algorithm Analytical Hierarchy Process (AHP). These factors were used as inputs for establishing a landslide susceptibility map based on the geographic information technologies (GIS) at A Luoi District, Thua Thien Hue province. Results of the study showed that landslide risk could be divided into five levels: very low risk of landslide covered 17,638.22 ha (14%), low risk areas accounted for 41,036.20 ha (34%), medium risk of landslide covered an area of 22,380.84 ha (18%), high risk area was 27,176.99 ha (22.19%), and very high risk area was about 14,231 ha (12%). The results of this study could be used to support the implementation of land use planning, which could help reduce adverse impact of landslides on people and property.

LAND USE; CARTOGRAPHY; LAND SUITABILITY; LANDSLIDES; GEOGRAPHICAL INFORMATION SYSTEMS; VIET NAM

E12 - LABOUR AND EMPLOYMENT

Contract farming through tea-horticulture intercropping system: a case study of Gambung Estate and horticultural farmers in Bandung, Indonesia. **Sita, K. kralawi.sita@gmail.com., Rosyadi, A.I. air_gambung@yahoo.com., Aji, T.M. Indonesian Research Inst. for Tea and Chinchona, West Java (Indonesia). trimarutoaji@gmail.com.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 15 (1) p. 75-85. 2018.*
https://ajad.searca.org/article?p=720

Contract farming is becoming a viable form of partnership between tea plantation companies and local farmers in the management of tea plantations. This study aimed to: (1) describe a contract farming pattern through the system of intercropping tea-horticulture, (2) analyze the efficiency of the management of tea garden with contract farming, and (3) describe the benefits and sustainability of the contract farming between Gambung Estate and horticultural farmers. The case study was conducted in Gambung Estate using qualitative descriptive analysis and contract farming scheme analysis. The study observed that the contract farming patterns applied was a modified nucleus estate model with a combination of resource provisioning cooperation with production management cooperation. The challenges for future contract farming include land management, new skill transfer, climate change, and shared risk and effort between the two parties so that the bargaining position of horticultural farmers will be increased in the sustainable tea plantation management framework. Value of investment efficiency was 47 percent for new planting and 49 percent for replanting. The highest R/C and B/C values were given to the intercropping system of tea-chili at 2:25 and 1:25, respectively.

CAMELLIA SINENSIS; TEA; HORTICULTURE; INTERCROPPING; CONTRACT FARMING; FARMERS; INDONESIA

Institutional resiliency: traditional rural labor institutions and rural industrialization in two Philippine villages. **Datoon, R.F. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Social Development Services.** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 128-144. 2017.*

This study examined why traditional labor institutions change and remain resilient in two farming villages in the Philippines with the establishment of a special economic zone (SEZ) in the area. The study focused on the institution of hunusan in rice harvesting. Specifically, this paper aims to describe the importance and benefits of traditional labor institutions, identify possible factors for change and resiliency and illustrate some implications. This study utilized both qualitative and quantitative methods as data were gathered through surveys, key informant interviews and field observations. The establishment of a SEZ in the town of Mariveles resulted in the diversification of livelihoods and increased preference of laborers to work in construction and SEZ, which, in turn, resulted to the difficulty of finding farm laborers, changes in farming practices, preference to be paid in wages and changes in traditional labor institutions in the villages. This study argues that traditional institutions provide benefits and can be resilient by accommodate changes. This is contrary to the view that such institutions are automatically replaced by market-based exchanges with industrialization and modernization. This study suggests that the resiliency of traditional institutions depends on their ability to reduce the risks and provide returns to people and in their ability to adjust with the changing economic environment without changing its underlying norms.

RURAL AREAS; INDUSTRIALIZATION; LABOUR; ECONOMIC ENVIRONMENT; PHILIPPINES

E13 - INVESTMENT, FINANCE AND CREDIT

Capital roll-over: a strategy for sustaining the financial source of smallholder farmers in Guagua, Pampanga [Philippines]. **Tan, M. A.C. tanmaengalie723@gmail.com., Corales, A.M. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Technology Management Services Div. Corales, R.G. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Agronomy Soils and Plant Physiolog y Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 167. 2019.*

Small-scale farmers produce the majority of food supply in developing countries despite their limited financial resources. This scarcity of capital, in many cases, constrain their use of yield-enhancing technologies and for this reason access to credit is a vital issue that need to be tackled. Rice farmers in Guagua, Pampanga [Philippines] had experienced the same situation. The shortage of capital limited their use of high-quality rice seeds and adequate amount of fertilizer which impede their rice productivity and profitability. In 2015, PhilRice in coordination with the Local Government of Guagua provided rice seeds and fertilizer for the roll-over scheme. The objective of the roll-over scheme is to provide some amount of financial capital to address the need for capital in the area particularly for the purchase of fertilizer and quality seeds. A total of P179,910.00 roll-over capital was generated by the KUMON Farmers' Association with 92.4% repayment. Results show that the use of high-quality seeds increased yield by 0.23t/ha during the wet season and 0.78t/ha in dry season translated to an added income of P9,390.33/ha and P19,392.69/ha, respectively. Moreover, the capital roll-over fund was extended to help finance the establishment of mushroom enterprise as an additional source of farm income to the farmers. Therefore, with enough capital, farmers can increase their yield and income in rice production.

PHILIPPINES; FARMERS; FINANCING; CAPITAL; CAPITAL FORMATION; PRODUCTIVITY; SUSTAINABILITY

E14 - DEVELOPMENT ECONOMICS AND POLICIES

Baseline assessment of the informal soybean farming system in the Philippines. **Atienza, V.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development. Dinglasan, A.A. ally.dinglasan@gmail.com., Enicola, E.E. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Aquino, A.L., Malayang, J.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Makiling, F.C. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 165. 2019.*

The informal sector is composed of farmers that normally operates individually and relies on indigenous knowledge and resources in managing their farms. Several studies have proven the significant roles of this sector but they are often neglected by the government. This study hopes to develop social sustainability mechanisms that would enhance the informal seed system. A baseline study was conducted through the conduct of surveys and personal interviews with 185 informal soybean farmers in the provinces of Bukidnon, Surigao del Sur, Agusan del Sur, Davao Oriental, Isabala, and Quirino [Philippines] in 2018.

Based on the preliminary results of the survey, the common challenges encountered by the farmers were the limited or unavailability of good quality seeds for planting, lack of farming equipment and technologies to improve their farming practices, and the lack of markets for their produce. However, the results also showed that they are several opportunities on how the system of the informal soybean sector can be improved. Based on the surveys, most of the farmers in the study sites are members of the organization in their area. In addition, it was also observed during the field visits, most farmers expressed willingness to improve their soybean farming practices. Hence, the following interventions are proposed: a) strengthening the existing farmer's cooperatives/organizations through capacity building (i.e. provision of technical assistance/trainings/livelihood tranings with lectures, demo, field visits) to empower the farmers and eventually improve their farming systems and practices; b) linkage of the people's organization and farmer's organization to possible partners such as the national agencies (i.e., DA, DTI, etc.), LGUs, NGOs, private/business, academe/research sector; and c) policy recommendations to enhance the informal soybean seed sector.

GLYCINE MAX; SOYBEANS; SEEDS; FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; PHILIPPINES

Building a sustainable social enterprise in the upland communities of North Cotabato [Philippines]. **Corales, A.M. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Technology Management Services Div. am.corales@philrice.gov.ph., Tabolin, E.H., Mama, S.S. Philippine Rice Research Inst., Midsaya, North Cotabato (Philippines). Baltazar, M.A.M. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Edraira, J.O., Grandual, M.B., Abdulkadil, O.H., Torreña, P.S., Abdula, S.E. Philippine Rice Research Inst., Midsaya, North Cotabato (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 166. 2019.*

North Cotabato [Philippines] is one of the food baskets in Mindanao because the area is suitable for growing a variety of crops. But the area is also one of the ten poorest provinces in the country with a 44.8% rate of poverty incidence. A big portion of the province is classified as upland with a suitable agroecology for the production of Dinorado rice, a pigmented and aromatic variety believed to have its origin in North Cotabato. Over the years, the market demand for Dinorado has increased but productivity remains low. Improving the productivity and profitability of Dinorado rice as a social enterprise offers an opportunity to improve the economic and social well-being of upland communities. In 2017, a participatory approach to develop a community-based rice-based enterprise with

Dinorado as major product was conceived. A Site Working Group (SWG) comprised of the PhilRice, USM, DA-RFO 12, DTI, DAR, CDA, and PCIC was formed to reinforce the provision of support in catalyzing the development process. Twenty (20) farmer-clusters (8 in Alamada and 12 in Banisilan, North Cotabato) composed of 726 farmers covering 1,357ha participated in the project. Farmers' Field School (FFS) with Technology Demonstration Farm as learning field were established resulting to average yield increment of 0.43 t/ha in Alamada and 0.03t/ha in Banisilan. Market scanning identified 30 potential markets with preferred product classification, demand, packaging, delivery, and price dynamics. A total of 2,997kg of polished and unpolished Dinorado amounting to approximately Php 200,00 was sold during test marketing. The farmer-clusters were able to consolidate 278 bags of palay for seeds and milling purposes, and for roll-over. Presently, five (5) farmer-technicians were tapped and being trained to ensure their social enterprise is sustained even if the project is over.

ORYZA SATIVA; VARIETIES; FARMING SYSTEMS; TECHNOLOGY; ENTERPRISES; RURAL COMMUNITIES; HIGHLANDS; SOCIAL PARTICIPATION; PROFITABILITY; MARKETING; PHILIPPINES

Building the capacities of marginalized women towards community-based climate change adaption: an evaluation of the Edible Landscaping training in Surigao del Norte, Philippines. **De Guzman, R.P. rpdeguzman@up.edu.ph., edible_landscaping@yahoo.com., Sanchez, F.C. Jr., Apacionado, B.V., Balladares, M.C.E., Medina, N.G., Tayoborgi, R.R.P., Torres, R.O. torresremuel@gmail.com.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 166-167. 2019.*

The art and science of edible landscaping (EL) technology involves the utilization of sustainable and organic-based agricultural practices, hence not only addressing the 'zero hunger' objective of millennium development goals (MDGs) but also providing a climate change adaptive mechanism. In this regard, a series of trainings on edible landscaping was conducted as part of a DA-BAR funded project in three different sites in the Philippines, one of which is among the marginalized group of women in the province of Surigao del Norte [Philippines]. By incorporating the participation of institutions as stakeholders, the project serves as a community-based approach in addressing the issues of food security in the context of climate change, especially in vulnerable areas such as the municipality of Claver, a coastal town with mining as its main economic activity. In order to determine the effectiveness of the training conducted among the women, this study utilized the first two levels of Kirkpatrick's model (1998) of evaluation, namely reaction, and learning levels. Results have shown that the women have demonstrated a significant increase in knowledge

about edible landscaping and its aspects. Furthermore, all of the participants have also expressed intention to apply the knowledge they gained at the training. Also, 93.33 percent of them perceived the training as a success, and 100 percent had confidence that they could apply what they have learned. Nonetheless, the participants have also reported challenges faced during the training, one of which is difficulty of understanding some of the more technical aspects of the technology. Still, the knowledge gained, as well as the confidence, and the willingness of the trained women in applying EL have provided the starting point for their community by which they can address the threatening consequences of climate change, at the same time being food self-sufficient atleast in the household level.

VEGETABLE CROPS; LANDSCAPING; TECHNOLOGY; DIFFUSION OF INFORMATION; TRAINING PROGRAMMES; WOMEN; CLIMATIC CHANGE; ADAPTATION; PHILIPPINES

Development of Modified Dapog Technology version for heirloom rice production in the Cordillera [Philippines]. **Batcagan, J.D., Credo, R.M.S., Rocabo, V.S. Philippine Rice Research Inst., Malasin, San Mateo, Isabela (Philippines). Isabela Branch Station. Ilar, G.Y., Concepcion, M.S. Philippine Rice Research Inst. Central Experiment Station, Maligaya, Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 181. 2019.*

Heirloom Rice (HR), being produced in the highland terraces by the Indigenous People of the Cordillera, has outstanding quality, aroma, texture, color, taste, and nutritional value which can compete in niche markets both locally and internationally. Despite its resilient physiognomies, production is being limited by biotic and abiotic constraints that need to be addressed. The development of suitable and location specific version of technologies is necessary to augment lacks in the natural system of farming. The introduction of Modified Dapog Technology in heirloom rice production aims to improve seedling management practices. It promotes transplanting of younger seedlings for enhanced tillering, and for faster and easier uprooting which reduce seedling stress. To develop a localized version, ten Participatory Technology Demonstration (PTD) sties were established in various sites in Cordillera. The study focused in determining the optimum seeding rate for a specific seedbed area as basis in packaging the technology. Three seeding rate treatments at 340 g/m2, 230 g/m2, and 680 g/m2 (lowland recommendation) were used. The lowland recommendations must have to be adjusted for the reasons that: a. traditional varieties have long maturity meaning longer growth period at the seed bed and b. they differ in the number of grains per unit of weight. Results show that seedlings from the 230 g/m2 plot have the best qualities in terms of height, roots, and leaf blades. Also, it was observed that the presence of the net and Carbonized Rice Hull (CRH) layer prevented low germination or

weak culm of surviving seedlings as caused by soil/cast deposits of aquatic worms require 9-12 kilograms seeds to be sown in a 50 m2 Modified Dapog Seedbed.

ORYZA SATIVA; INDIGENOUS ORGANISMS; SOWING; SOWING RATES; TECHNOLOGY; TECHNOLOGY TRANSFER; PHILIPPINES

Development of mushroom production technology to increase farmers' income in the Philippines. **Tabil, Ma.A.U. Philippine Rice Research Inst., Malasin, San Mateo, Isabela (Philippines). Ha, W. Korea Programan International Agriculture BPI Compound, Los Baños, Laguna (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 168-169. 2019.*

Korea Program on International Agriculture (KOPIA) is one of the partners of the Philippines in transforming Filipino farmers to be more profitable, resilient and sustainable through responsive, balanced, environmentally sound and partnership-based research, development and extension. The program aims to explore opportunities to enhance farm productivity and household income in rural farming communities. The success of the project will give quality and positive outputs and accomplishments which, in the end, will benefit not just the institution, but most especially the farmers. Three (3) farmers' group were formed in Isabela, Cavite and Bohol [Philippines] and were considered as the beneficiary of the project patterned in the Saemaul Undong (New Community Movement) of Korea following the 3 basic Saemaul spirits: Diligence, Self-help and Cooperation. Mushroom house was constructed in each site complete with growing house, laboratory, soaking tank and working area. During the first year 2018, 399 farmers, students, government employees, out-of-school youth, stay home mothers and other mushroom enthusiasts were able to attend mushroom production and processing training which is 199.5% of the total target for the first year. Twenty percent (20%) decrease in production cost were taught to farmers by teaching new ways to mushroom production and a 50%-100% farm household income increase. Products produced by farmer members specifically Mushroom chili garlic oil, Mushroom Atsara and Mushroom Bagoong are now registered under the Department of Trade and Industry. New product is being developed in cooperation with the Department of Agriculture RFO2 led by Dir. Rosemary G. Aguino, RTD Research and Regulatory, mushroom powder seasoning which aims to use the mushroom powder as substitute for Magic Sarap and Ajinomoto, a new and healthier way of cooking. Another is the rice - mushroom noodles which can be used to showcase characteristics of pigmented and aromatic rice traditional varieties in addition to the mushroom ingredient.

EDIBLE FUNGI; PRODUCTION; FOOD PROCESSING; TECHNOLOGY; TECHNOLOGY TRANSFER; FARMERS; INCOME; PHILIPPINES

Development of package of technologies for off-season production of mangosteen (Garcinia mangostana Linn.). **Regulacion, A.N., Antiola, R.M., Lutarte, G.M.N., Dolam, M.C. Department of Agriculture Regional Field Office II, Manambulan, Tugbok District, Davao City 8000 (Philippines). Davao Region Central Experiment Station.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 34. 2019.*

The development of package of technologies for off-season production of mangosteen (Garcinia mangostana Linn.) was conducted at Davao Region Central Experiment Station (DARCES). Manambulan, Tugbok District, Davao City [Philippines] from January 2016 to December 2018, to determine appropriate technology that could help increase mangosteen production. The treatments following treatments were used: rain shelter, pruning, plastic mulching, and bark ringing. The control treatment, pruning, plastic mulch and bark ringing of trees, initiated flushing of leaves after experiencing heavy rains in December having the highest precipitation of 238.50 mm. Mangosteen trees covered with rain shelter flowered at 60 days of water deficit. All the upper branches under rain shelter treatment had a high flower induction at about 95% than the lower branches with only 30%. The temperature was also higher on the upper portion of the branch that reached an average noon temperature of 35 degrees Celsius than in the lower portion with an average temperature of 32 deg C. High temperature and water stress may cause the mangosteen trees to induce flowers especially at the upper portion of the trees where the temperature is high. The microclimate inside the rain shelter was controlled resulting in a drought and higher temperature condition that triggered the trees to induce flowers after 60 days of stress period. Off-season mangosteen fruits had the same fruit size and taste quality from season fruits. It had a yield of 28.85 kg/tree in addition to the season production of 56.68 kg/tree. Based on the result, mangosteen can be managed to induce flower for production. Producing off-season mangosteen is a profitable technology with an income of Php 1,052,740.00/ha or 148% return of income.

GARCINIA MANGOSTANA; MANGOSTEEN; OUT OF SEASON PRODUCTS; PACKAGING

Digital genebank for sustainable of precision biotechnology. **Kohli, A. International Rice Research Inst., DAPO Box 7777, Manila (Philippines). Plant Breeding Genetics and Biotechnology Dept.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View

Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 2. 2019.*

Crop improvement for food and nutritional security within the sustainable and equitable framework is an imperative with no options. The increasing number of mouths to feed i s the chief driver. Importantly however, changes in the landscape towards urbanization; in socio-economic preferences towards non-agrarian jobs; in fresh water supplies towards depleting reservoirs and in climate patters towards inclement weather events of drought, salinity, submergence, heat and cold, all necessitate concerted efforts towards addressing the land, water, labor and energy challenges facing agriculture. Science and technology are the only recourse for providing the required alternatives and efficiencies that can help us cope with the problems. One mushrooming aspect of science and technology is the digital technologies, which makes extensive data available for relatively easy analysis and predictions for conducting science in a more rapid and precise manner towards the desirable solutions. This talk will describe how various accessions of rice available in the genebank at IRRI [International Rice Research Inst.] can be used through the digitization technologies to food into various programs for crop improvement in a faster and more efficient manner.

GENOTYPES; SUSTAINABILITY; PLANT BIOTECHNOLOGY; TECHNOLOGY TRANSFER

Digital rice farming in the Philippines. **Barroga, R. F. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 2-3. 2019.*

In 2014, the Philippine Rice Research Institute (PhilRice) established the Future Rice farm where the latest innovations from PhilRice, the science community, and the industry were showcased to farmers, extension agents, local government, and students. These innovations were in response to emerging issues on environmental protection, climate change, peak oil, alternative energy, production efficiency, and food safety. Today the farm serves as a test bed of smart farming innovations, precision agriculture, and farm automation. Using practical ICTs and electronics, young IT specialists and students design an array of farm monitoring sensors and controls that automatically collect farm data such as paddy water level, water quality, ammonia gas level, and warehouse environment. These sensors are tied to remote controls for irrigation water gates, drip irrigation, fish feeder. Prototype unmanned tractors and seeders, and drone technology for precision spraying and precision fertilizer application are also being developed and tested in the farm by student and inters, as well as industry partners. To control all these farm gadgets, young

programmers have developed a farm dashboard to monitor, enabling the farm owner to remotely monitor and control the farm. To further enable extension agents and young farmers to migrate into digital farming, smart farm apps are continuously being developed to guide farmers in selecting rice varieties, identifying weeds, and recording farm activities and scheduling farm tasks. These apps are now available for download for free. Through digital farming we have reduced the cost of production in rice farming, increased efficiency, and made application of chemicals more precise, making its safer for the farmer and consumers. The Future Rice farm provides valuable lessons to policy makers we join the global agriculture 4.0 environment.

ORYZA SATIVA; FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; PHILIPPINES

Documentation of success stories in the use of Trichoderma koningii in the Philippine highland farming systems. **Labon, K.O. Benguet State Univ., La Trinidad, Benguet (Philippines). Inst, of Social Research and Development. kacylabon@gmail.com., Batani, R.C., Lancio, R.C. Benguet State Univ., La Trinidad, Benguet (Philippines). Office of Extension Services. Macasangcay, T.D. Benguet State Univ., La Trinidad, Benguet (Philippines). Northern Philippines Rootcrops Research and Training Center. Laurio, C.C. Benguet State Univ., La Trinidad, Benguet (Philippines). Inst, of Social Research and Development. claurio@bsu.edu.ph.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 182. 2019.*

The technology of using Trichoderma Koningii as biological control agent in crop production in highland farming has been proven effective based on on-station and on-farm field experiments. However, the effectiveness and success of any R and D output is not in the development and delivery of the technology itself, but in the sustainable use and impact of these technologies by farmers in farmers' fields. This paper focused on examining the outcomes and impacts of Trichoderma Koningii through the documentation of individual success stories and experiences of farmer adopters. It used case study approach and in-depth interviews with more than five users and repeat users. Qualitative documentation showed that the effects of Trichoderma Koningii is most felt in terms of improvement in crop health, soil condition, and human health most seen in conventional and GAP farming. With the huge environmental and human health risks associated with chemical exposure for conventional and GAP farmers, the use of Trichoderma Koningii as substitute for synthetic fungicide was perceived to have significantly helped lower these risks among highland flower and vegetable farmers. Its use for organic farming, on the other hand, is largely as catalyst material for compost fertilizer. Based on the case study of a sweet potato producing community greatly affected with fusarium wilt, and personal accounts from

farmers, the technology along with the use of tissue-cultured clean sweet potato planting materials showed positive impact in terms of both yield and survival rate. However, further study should be conducted to validate the effect of the technology when isolated from the effect of the clean planting materials used. Further documentation of additional success stories covering the use of the technology on other crops is also recommended.

IPOMOEA BATATAS; SWEET POTATOES; FUSARIUM; WILTS; BIOLOGICAL CONTROL AGENTS; TRICHODERMA KONINGII; TECHNOLOGY; TECHNOLOGY TRANSFER; HIGHLANDS; PHILIPPINES

Evaluation of the Department of Agriculture's Corn Clustering Program implementation in major corn producing provinces in the Philippines. **Gaylican, J.K.M., Del Carmen, D.R., Serrano, N.M.K.P., Piñgol, N.A.S., Nguyen, M.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Postharvest Training and Research Center.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 8-9. 2019.*

The DA's Corn Banner Program in clustered approach, institutionalized in 2010, aimed to increase corn productivity and quality, and reduce losses and production costs to increase farmers' income. The program envisions a more efficient and effective intervention distribution so nearly a decade later clustering was assessed by analyzing program outcomes and integrity. The former relates to accomplishment of intended goals while the latter is defined by adherence, dosage, delivery quality, and participant responsiveness. Program integrity is important but has often been neglected in most program evaluations that focus mostly on outcomes as success indicator, hence this study. Data were gathered in 2017-2018 through interviews with farmers, farmer officers, and DA and LGU implementers from Pangasinan, Isabela, Bukidnon, South Cotabato [Philippines]. In 2011-2017, only South Cotabato exceeded their yield targets by 15% but declined by 7% in value. As for area only Pangasinan exceeded its target by 2% and grew by 20% in value. All perceived no decline in postharvest losses except Pangasinan and South Cotabato. No province adhered to the prescribed program framework for cluster organization and classification. Hence, their status was reclassified--functional or non-functional. In all provinces, members of functional clusters score better outcome indicators. Mann-Whitney showed that beneficiaries under both cluster types receive the same total number of interventions statistically. Furthermore, 32% of respondents reported that among various problems, quality of delivery is affected mostly by lack and mismatch of interventions and 22% attributed difficult implementation to poor cluster officers' performance. The Wilcoxon Signed Rank Test showed that respondents illicit significantly higher participation after clustering (p=0.0001). Thus,

beneficiaries were deemed as more participative because interventions increased dramatically since clustering. Therefore, outcomes and integrity parameters indicate a need to empower local implementers and farmers by streamlining the program budget to extension operating funds and allowances, and easier credit provision.

ZEA MAYS; PROJECT EVALUATION; TECHNOLOGY; TECHNOLOGY TRANSFER; PHILIPPINES

Factors associated with farmers' adaptation practices to weather variability in rice-based farming system in Myinmu Township, Sagaing Region, Myanmar. **Khaing, K.T. Yezin Agriculrtural Univ. Yezin (Myanmar). dept. of Agricultural Extension. kaythinkaing2004agro@gmail.com., Boconguis, R.D.T., Serrano, E.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Sta. Cruz, P.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Agriculture and Food Science. Cambel, R.G. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Arts and Sciences.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 4 p. 169-199. 2017.*
https://jpad.cpaf.uplb.edu.ph/articles/factors-associated-with-farmers-adaptation-practices-to-weather-variability-in-rice-based-farming-system-in-myinmu-township-sagaing-region-myanmar/

Due to its dependence on agro-climate condition, the rice-based farming system in Myinmu Township in Central Dry Zone (CDZ), Myanmar is one of the sectors that is vulnerable to weather variability. This study aimed to analyze the association of adaptation practices on production and income of rice farmers in Myinmu Township. One hundred fifty farmers were surveyed and key informant interviews were conducted to gather primary data. Results revealed that most farmers received agricultural and weather information from fellow farmers, extension agents from the Department of Agriculture, attendance to group meetings, and mass media channels such as radio and television. Adaptation practices were categorized into changing cultivated varieties and crops, changing farming systems, conserving rain water, improving irrigation systems, and engaging in non-farm activities. Factors associated with adaptation practices were type of agriculture (ecosystem), total cultivated area, total rice cultivated area, credit accessibility, attendance to training programs and access to inputs. Overall, results revealed an observable pattern of increased weather variability and minimal adaptation practices, which calls for a more vigorous extension intervention to promote practices that can minimize the impact of weather variability on farmers' production and income.

ORYZA SATIVA; FARMING SYSTEMS; TECHNOLOGY; ADAPTATION; TECHNOLOGY TRANSFER; FARMERS; WEATHER; MYANMAR

Farmers preferences in the adaptation and dissemination of white corn as staple food in Eastern Visayas [Philippines]. **Almeroda, B.B., Bulawan, A.D., Palma, J.C.C., Calutan, M.N. Department of Agriculture-Regional Office 8 (Philippines). Abayog Experiment Station. Londina, L.A. Department of Agriculture-Regional Field Office (Philippines). Research Div. Dupal, N.M. Local Goverment Unit-Office of the Provincial Agriculture, Leyte (Philippines). Cabaña, N.N. Local Goverment Unit-City Agriculture Office, Baybay City, Leyte (Philippines). Labios, R.V., Labios, J.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural System Cluster. Manguiat, P.H., Malayang, D.B.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural System Cluster. Manguiat, P.H., Malayang, D.B.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Plant Breeding.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 183. 2019.*

The project have two components: (1) on-farm participatory varietal selection (PVS) and (2) seed system of newly developed improved white corn varieties. The PVS of 11 white corn flint and 1 local variety was conducted at Brgy. Butigan and Brgy. Maganhan, Baybay City Leyte [Philippines] to test yield performance, and adoption compared with farmers' variety during 2015 wet season (WS) and dry season (DS). The varieties/entries used were: IES 10-04, IES 89-10, IPB var6, IPB var8, USM var24, USM var22, USM var28, Northland White, Tupi Red Cob and Pito-pito and Kalimpos as local variety. Results revealed that NGR 800 (Northland white), IES 10-04 and Kalimpos, a local variety, were the top three performing varieties/entries based on yield, preference analysis and sensory evaluation, milling recovery and storage evaluation conducted. Northland white was significantly preferred by the farmers because of its softness, taste like cooked rice, not cohesive, taste good, white when cooked, and long and big ears, medium ear height, and complete kernel rows. Northland and Kalimpos were used for seed system and outscaling and 36 farmers were already availed. Beneficiaries have the chance to harvest and select good quality corn ears in the field instead of giving them shelled corn.

ZEA MAYS; MAIZE; VARIETIES; SELECTION; FARMERS; TECHNOLOGY; TECHNOLOGY TRANSFER; ADAPTATION; DIFFUSION OF INFORMATION; PHILIPPINES

Feedback from the field: facilitating knowledge sharing and learning from farmers to R [research] and D [development] workers. **Manalo, H.H.M. hb.manalo@philrice.gov.ph., hannahhazelmavi@gmail.com., Marama, R.M., Ramos, F.M. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019.

Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 174. 2019.

The establishment of technology demonstration (techno demo) farms and field days as knowledge sharing and learning (KSL) activities could accelerate adoption of technologies. However, to facilitate KSL from farmers to R and D workers, there's a need to gather feedback during the conduct of these activities for a better recall and present the feedback during project meetings. Individual interviews were conducted among 84 farmers during the provincial hybrid rice derbies in Ilocos Sur, Ilocos Norte, La Union, and Pangasinan [Philippines]; and the national rice technology forum (NRTF) in Pangasinan. Notes and transcriptions were analyzed. The study showed that some farmers had not planted hybrid rice owing to its high seed and production costs and being laborious, presence of high-yielding inbred rice varieties, and water unavailability. Also, most of the hybrid rice farmers had not planted public hybrid rice owing to the inaccessibility and unavailability of its seeds and farmers' lack of knowledge on public hybrid rice. These findings were presented to the development workers and they recommended that seed production and promotional activities should be intensified. Based on their field observations, the farmers also identified the best characteristics of their top hybrid rice varieties. This finding could serve as input to the hybrid rice breeding activities of the institute in the future. They also identified the strengths and characteristics that need improvement of Mestiso 20 (M20), a public hybrid rice showcased during derbies and NRTF. This finding was presented to the researchers and they recommended for the development and testing of location-specific F1 cultivation protocols for M20 and deployment of laborers equipped with hybrid rice production knowledge and skills in the techno demo farms owing to its mismanagement. Findings in this study can facilitate the institutionalization of feedback mechanisms in KSL activities to eventually help accelerate technology adoption among farmers.

ORYZA SATIVA; HYBRIDS; TECHNOLOGY; TECHNOLOGY TRANSFER; RESEARCH; DIFFUSION OF INFORMATION

Improvement in self-assessed knowledge and changes in farming system practices of climate field school graduates in Bicol, Philippines. **Ruelos, R.A.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Center for Strategies Planning and Policy Studies. Umali, M.G., Olviga, T.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Villa, R.S., Dr. Emilio B. Espinosa, Sr. Memorial State College of Agriculture and Technology, Mandaon, Masbate (Philippines). Jacobo, E.S.V. Alejandro T. Manaog Elementary School, Hacienda Salamat, Cadlan, Pili, Camarines Sur (Philippines). Paunlagui, M.M., Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. acrola@up.edu.ph.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 4 p. 143-167. 2017.*

https://jpad.cpaf.uplb.edu.ph/articles/improvement-in-self-assessed-knowledge-and-changes-in-farming-system-practices-of-climate-field-school-graduates-in-bicol-philippines/

Rainfed lowland and upland farmers have less access to new technologies especially those that would reduce their vulnerability to climate change. In the Philippines, the Philippine Rice Research Institute developed a package of technology called 'Palayamanan' that is suited to rainfed sites. This paper presents the results of the study that disseminated the Palayamanan technology through the climate field school (CFS) in rainfed areas in Bicol. Thirty-eight farmers from two barangays of Pamplona, Camarines Sur, and 78 farmers from three barangays of Milagros, Masbate were the respondents. A five-point scale was used to self-assess farmers' knowledge on topics discussed in the CFS, which were divided into four major parts: climate science, rice production, vegetable and animal production, and pest and water management. Weighted means of the farmers' self-assessed knowledge scores before and after the CFS were generated. The Mann-Whitney U method was used to test the significance of the differences in the pre-and post-test scores. The differences between pre- and post-test scores were highly significant (at 5% level), especially on the clustered topics of climate, land preparation and seedling establishment, soil nutrient management, pest management, and harvesting. Some farmer-cooperators shifted from traditional crop varieties to high-value crop, thus, changing their farming systems from subsistence to commercial. Farmer-graduates in Pamplona and Milagros have improved self-assessed knowledge and farm practices of some farmer-cooperators also changed, resulting in more advanced farm technologies being adopted in the area. The participants also engaged in new recreational activities such as backyard farming, which became a supplemental source of income. There is need to conduct similar study that investigates other factors or variables that could affect farmers' participation in the CFS. The CFS as a mode of extension delivery in rainfed areas is still in its infancy stage. More funds can be poured into the strengthening of the curriculum as well as capacitating the agricultural technicians to be competent resource persons.

FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; DIFFUSION OF INFORMATION; STUDENTS; PHILIPPINES

Information acquisition and conservation farming practices for sustainable agriculture in rural Vietnam. **Thi Quynh Anh Le. Hue Univ. (Vietnam). Faculty of Economics and Development Studies. lethiquynhanh25@gmail.com., Shimamura, Y. Kobe Univ. (Japan). International Cooperation Studies. Yamada, H. Keio Univ., Tokyo (Japan). Faculty of Economics.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 18 (1) p. 31-48. 2021.*
https://ajad.searca.org/article?p=1226

Soil fertility conservation has become an increasing concern in Vietnamese agriculture owing to the excessive use of agrochemicals. The use of organic fertilizers is considered an environment-friendly practice for sustainable agriculture. Although environmental awareness has emerged and production technologies of organic fertilizers have been introduced in recent years, their adoption remains limited among farming households. This study focuses on the causal effects of information acquisition on the use of organic fertilizers from agricultural extension services and from peers of farming households. The estimation results show that land size, land tenure, educational level, family labor endowment, and household wealth are significantly associated with the likelihood of using organic fertilizers. Information acquisition through both information sources positively affects the use of organic fertilizers. However, information acquisition from agricultural extension services has a greater marginal impact than that from peers. Despite its lower influence, information acquisition from peers plays a supplemental role in incentivizing farming households to use organic fertilizers as an environment-friendly agricultural practice among rural communities in Vietnam.

AGRICULTURE; FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; ORGANIC FERTILIZERS; DIFFUSION OF INFORMATION; VIET NAM

Monitoring evaluation and learning (MEL): of rice crop manager (RCM) Philippines. **Baradas, A.C.M. International Rice Research Inst., Los, Baños, Laguna (Philippines). Sustainable Impact Platform. Santos, A.G.DC. Department of Agriculture 2nd Floor BSWM Bldg. Elliptical Rd., Diliman, Quezon City (Philippines). Planning and Monitoring Services. Cabrera, E.R., Villanueva, D.B. International Rice Research Inst., Los, Baños, Laguna (Philippines). Integrated Research Support Platform. Vila, J.R. International Rice Research Inst., Los, Baños, Laguna (Philippines). Marte, K.S. Department of Agriculture 2nd Floor BSWM Bldg. Elliptical Rd., Diliman, Quezon City (Philippines). Planning and Monitoring Services.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 176. 2019.*

A national MEL activity was conducted to assess the effectiveness of the RCM technology. RCM provides customized guidelines to individual farmers on crop management practices best suited for their specific rice-growing conditions. A total of 3,647 respondents were randomly sampled from the municipalities that belong to the 75th percentile of the regional number of RCM recommendations generated. Fifty-one percent of respondents received RCM recommendations (RCM farmers) and 49% did not received RCM recommendations (Non-RCM farmers). Results showed that 27% of RCM farmers followed at least one of the recommendations provided by RCM. Paired t-test revealed that after a farmer followed at

least one of the fertilizer recommendations, there is an average yield and net return increase of about 880 kg ha-1 and 20,402 Php ha-1, respectively. Farmers who were exposed to RCM had an average of about 350 kg increase in yield and 6,128 Php ha-1 increase in net returns over time compared to non-RCM farmers. Lastly, using probit regression model, the factors that significantly affect the uptake of RCM were type of interviewer, access to loan, yield level before exposure to RCM, number of days between interview and delivery, number of seasons receiving RCM recommendation, timing of receipt of RCM recommendation, crop establishment method and variety type. This study demonstrates evidences on the impact of RCM on yield and net returns of farmers. Moreover, the identified factors influencing the adoption of RCM can be used as a decision tool in future dissemination of RCM technology.

RICE; DECISION SUPPORT; TECHNOLOGY; TECHNOLOGY TRANSFER; FARMERS; MONITORING; EVALUATION; PHILIPPINES

Optimizing F1 seed production of pre-commercial public hybids. **Corpuz, M.V. nique4398@gmail.com., Gramaje, L.V. lvgramaje@philrice.gov.ph., Caguiat, J.V., Brena, S.R., Desamero, N.V. Philippine Rice Research Inst. Central Experiment Station, Maligaya, Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 177. 2019.*

The adoption of public hybrid rice varieties in the Philippines is hindered by the limited supply of F1 seeds highlighting the need for increased seed production efficiency and reproducibility. This study was conducted to determine optimal cross combination-specific to differential seeding technique, and parent row ratio to maximize F1 seed yield. Synchronization of flowering of Mestiso 55 (IR79128A X PR31559-AR32-4-3-2R) and Mestiso 73 (PRUP TG101 x SN758) parents were attained through leaf number method. For Mestiso 55, the CMS line must be sown when the R line is a t 0.25 leaf stage to attain good synchronization. For Mestiso 73, the S line must be sown when P line is at 1.1 leaf stage during the dry season under Nueva Ecija Condition. Seed yield response to different parent row ratios of Mestiso 55 and Mestiso 73 were observed. A x R row crossing plots with 2:6, 2:9, 2:12, and 2:15 female to male parents were established in randomized complete blocks with two replications. Using analysis of variance (a = 0.05), significant treatment mean differences were detected, suggesting that 6:15 row ratio is the most optimal for M55 and 6:12 for M73. Maximum seed yield attained was 1993.07t ha-1 for Mestiso 55, and 1178.39 t ha-1 for Mestiso 73. Seed reproducibility enhancement studies of experimental, and highly adopted NSIC-released rice hybrids with additional approaches are ongoing. The results

obtained can be of great help towards developing a demand-responsive hybrid rice seed sector, playing a role in subsequently increasing cultivation of public hybrid varieties.

ORYZA SATIVA; HYBRIDS; FLOWERING; TECHNOLOGY; TECHNOLOGY TRANSFER

Prolific millennial farmer finds further success in inspiring viewers on social media. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (1) p. 24-28. 2021.*
https://www.agriculture.com.ph/2020/11/15/prolific-millennial-farmer-finds-further-success-in-inspiring-viewers-on-social-media-part-1-from-farmer-to-agriculture-influencer/

FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; DIFFUSION OF INFORMATION; FARMS; RURAL AREAS; TOURISM; MASS MEDIA

Transformative learning as a ground-up approach to sustainable development: narratives from Vietnam's Mekong Delta. **Nguyen Minh Quang. nmquang@ctu.edu.vn., Le Van Nhuong. lvnhoung@ctu.edu.vn., Ho Thi Thu Ho. httho@ctu.edu.vn., Le Van Hieu. lvhieu@ctu.edu.vn., Trinh Chi Tham. tctahn@ctu.edu.vn., Nguyen Thi Ngoc Phuc. Cantho Univ. (Vietnam). ntnphuc@ctu.edu.vn.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 16 (2) p. 97-117. 2019.*
https://ajad.searca.org/article?p=1039

As the Vietnamese government continues to seek appropriate actions to move the national action on climate change forward, the emergence of grassroots sustainability initiatives has the potential to promote sustainability from the ground up. This paper reviews the current concepts of transformative learning (T-learning) and its importance through which some substantial linkages between T-learning and sustainability can be identified. It outlines the environmental changes in Vietnam's Mekong Delta, which appear to serve as 'disorienting dilemmas' that force the local people to learn and gradually transform their behaviors and lifestyle choices to align with a low carbon and sustainable development. In an ideal T-learning approach, the major beneficiaries are the small-scale farmers, women, and ethnic groups (learners). They learn by doing under the supervision of educators (experts) in field-based schools that offer real-life experience and encourage learners to shift from traditional farming practices to modern, eco-friendly agricultural models that promote local economic self-reliance and biodiversity conservation. The paper sheds new light on how a critical approach to education for sustainable development through T-learning is an appropriate form and why T-learning should be acknowledged as an important part of the broader approach to self-help, climate resilient development in vulnerable communities.

EDUCATION; EXTENSION ACTIVITIES; MANGROVES; PRAWNS AND SHRIMPS; FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; INDIGENOUS KNOWLEDGE; FARMERS; VIET NAM

E20 - ORGANIZATION, ADMINISTRATION AND MANAGEMENT OF AGRICULTURAL ENTERPRISES OR FARMS

Agritourism strengthens communities through sustainable agriculture. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25(4) p. 44-48. 2021.*

VEGETABLE CROPS; LIVESTOCK; CHICKENS; FARMS; FARMING SYSTEMS; RURAL AREAS; TOURISM; SOCIAL PARTICIPATION; COMMUNITY INVOLVEMENT

Airline professional turned her parents' idle land into a farm tourism destination. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 36-38. 2020.* https://www.agriculture.com.ph/2020/07/13/airline-professional-turned-her-parents-idle-land-into-a-farm-tourism-destination/

VEGETABLES; VEGETABLE CROPS; FRUIT TREES; LIVESTOCK; FARMING SYSTEMS; FARMS; RURAL AREAS; TOURISM

Bank chairwoman also runs an educational garden destination. **Taculao, P.B.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 22-25. 2021.* https://www.agriculture.com.ph/2020/08/03/pnb-chairwoman-also-runs-a-diverse-and-educational-garden-destination-part-1/

CROPS; LIVESTOCK; FARMING SYSTEMS; ORNAMENTAL PLANTS; DOMESTIC GARDENS; GARDENING; FARMS; RURAL AREAS; TOURISM

Batangas [Philippines] family forum still finds success in small-scale operations. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 20-23. 2021.*

VEGETABLE CROPS; FRUIT TREES; INDIGENOUS ORGANISMS; FARMS; RURAL AREAS; TOURISM; DIFFUSION OF INFORMATION; EXTENSION ACTIVITIES; PHILIPPINES

Bulacan [Philippines] mango orchard gains new life as a leisure family farm. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 23-24. 2021.*

MANGIFERA INDICA; MANGOES; FARMS; ORCHARDS; FRUIT TREES; FISHES; CHICKENS; DUCKS; FARMING SYSTEMS; PHILIPPINES

Cavite [Philippines] interior designer is also a weekend farmer. **Mendenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 28-31. 2021.*

FRUIT TREES; LIVESTOCK; POULTRY; FARMS; FARMING SYSTEMS; RURAL AREAS; TOURISM; APICULTURE

Comparison of contingent valuation and travel cost method in estimating the recreational values of a forest park in Iran. **Amirnejad, H., Jahanifar, K., Sari Agricultural Sciences, and Natural Resources Univ., Sari (Iran).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 36-44. 2018.*

Today, countries that focus more on economic development considers the tourism industry as a major contributor to it. As one of the major field of tourism, ecotourism is seriously promoted. Estimating monetary value of environmental resources of ecosystem function is a method for understanding if the investments for conservation, improvement or revival of the environmental resources earned social welfare improvements. In this study, the recreational value of Bamo National Park (BNP) was estimated and measured using two methods of Contingent Value Method (CVM) and Travel Cost Method (TCM). The variables, inhabitance, distance from park, first visit, number of visit, deontologist, education, travel cost, visitors income, museum existence and existence of animal species were the effective variables on willingness to pay (WTP) of visitors in 2015. Monthly expected willingness to pay of Consequentialist and Deontologist visitors was US$ 2.08 and 2.47, respectively. Finally, the recreational value of Bamu Park, which were estimated in two methods was equivalent US$ 43940.47 and 79959.25, respectively, in 2015. The travel cost method used the market price information and it revealed there is willingness to pay and 90.7% of visitors have zone inhabitance. Further, travel cost function was ideal for the econometrics theoretical aspect and preferred using the travel cost method instead of contingent value method to valuating the Bamo National Park.

RECREATIONAL AREAS; ECONOMIC DEVELOPMENT; TOURISM; RESOURCE MANAGEMENT; NATURE RESERVES; IRAN ISLAMIC REPUBLIC

Diverse agroforestry farm has been in business for 28 years. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 61-63. 2020.*
https://www.agriculture.com.ph/2020/07/15/a-diverse-agroforestry-farm-thats-been-in-business-for-28-years/

CROPS; FOREST TREES; FRUIT TREES; FARMS; FARMING SYSTEMS; RESOURCE MANAGEMENT; APIDAE; APICULTURE; AGROFORESTRY

Dragon fruit farm originally meant to treat a special needs individual sparks interest in the town of Burgos, Ilocos Norte [Philippines]. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 20-22. 2021.*
https://www.agriculture.com.ph/2020/11/30/dragon-fruit-farm-originally-meant-to-treat-a-special-needs-individual-sparks-interest-in-the-town-of-burgos-ilocos-norte-part-1-from-family-farm-to-community-pioneer/

HYLOCEREUS; PLANTING; FARMS; FARMING SYSTEMS; RURAL AREAS; TOURISM; PROCESSING; PROCESSED PLANT PRODUCTS; PHILIPPINES

Dragon fruit farm that started as a hobby is now a budding farm tourism site. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 32-34. 2021.*
https://www.agriculture.com.ph/2020/08/14/a-dragon-fruit-farm-that-started-from-a-hobby-is-now-a-budding-farm-tourism-site-part-1/

HYLOCEREUS UNDATUS; PLANTING; FARMS; RURAL AREAS; TOURISM

Efficiency and effectiveness of the Philippine Crop Insurance Corporation's Rice Crop Insurance Program: the case of Laguna Province, Philippines. **Rola, A.C.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Graduate School. accrola@gmail.com. Querijero, N.J.V.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 4 p. 29-49. 2017.*
https://jpad.cpaf.uplb.edu.ph/articles/efficiency-and-effectiveness-of-the-philippine-crop-insurance-corporations-rice-crop-insurance-program-the-case-of-laguna-province-philippines/

The performance of the Rice Crop Insurance Program (RCIP) of the Philippine Crop Insurance Corporation (PCIC) was assessed to explain the low number of insured farmers and suggest ways to improve the program's efficiency and effectiveness. Documents were reviewed and primary data were collected through survey of participating rice farmers and key informant interview of the officers and staff of PCIC Region 4 [Cavite, Laguna, Batangas, Rizal, and Quezon] and National Irrigation Administration Region 4 Employees Multipurpose Cooperative (NEMCO). Descriptive statistics, gap analysis, and Likert scale scoring were used in data analysis. Results of the study revealed gaps in enrollment in the program, duration of filing of application for cover, number of days in team of adjusters' response,damage estimates, and delays in receipt of indemnity, which resulted in a low efficiency score of the program. Data analysis also revealed that the RCIP was moderately effective. Hence, to boost its efficiency and effectiveness, this study recommends that the

PCIC should: a) intensify technical capacity-building training for the team of adjusters; b) deputize officers and staff of the municipal agricultural office as members of the team of adjusters; c) provide stronger and more hands-on assistance to participating farmers; and d) increase the incentives and number of personnel involved in RCIP implementation.

CROP INSURANCE; FARMERS; FINANCIAL SITUATION; PROJECT MANAGEMENT; PROJECT EVALUATION; PHILIPPINES

Family farm is also a tree sanctuary and a home for rescued Taal [Batangas, Philippines] horses. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 29-33. 2020.* https://agriculture.com.ph/2020/09/06/family-farm-is-also-a-tree-sanctuary-and-a-home-for-rescued-taal-horses/

FARMS; RURAL AREAS; TOURISM; CROPS; FRUIT TREES; ORYZA SATIVA; PLANTING; HARVESTING; INDIGENOUS KNOWLEDGE

Family rest house is now an agritourism site that offers a taste of real Filipino charm. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p. 40-42. 2021.* https://agriculture.com.ph/2020/08/24/family-rest-house-opened-as-an-agritourism-site-that-offers-a-taste-of-real-filipino-charm/

VEGETABLE CROPS; FRUIT TREES; FARMING SYSTEMS; CHICKENS; INDIGENOUS ORGANISMS; DUCKS; RURAL AREAS; TOURISM; FARMS

Farm stands strong after Taal Volcano [Batangas, Philippines] eruption and now, amid the health crisis. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p. 42-50. 2021.* https://agriculture.com.ph/2020/08/11/a-farm-stands-strong-after-the-taal-volcano-eruption-and-now-amid-a-health-crisis/

VEGETABLE CROPS; FARMS; CROPS; CROP MANAGEMENT; RURAL AREAS; TOURISM

Former OFW turned coconut farmer earns over P[hp]100,000 a month. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 8-10. 2021.*

COCOS NUCIFERA; CROPS; LIVESTOCK; FARMING SYSTEMS; RURAL AREAS; TOURISM; FARMS; FARMERS; INCOME

Manileno family who moved to Albay [Philippines] finds success on farming and earns over P[hp]60,000 a month. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 35-39. 2021.*

https://agriculture.com.ph/2020/11/19/natures-boon-manileno-family-who-moved-to-albay-finds-success-in-farming-and-earns-over-p60000-a-month-part-1-establishing-the-farm/

CROPS; FARMS; RURAL AREAS; TOURISM; LIVESTOCK; ORGANIC AGRICULTURE; PHILIPPINES

Orchid farm in Bulacan [Philippines] makes the luxury plant available for all. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 24-27. 2021.* https://agriculture.com.ph/2020/07/24/an-orchid-farm-in-bulacan-makes-the-luxury-plant-available-for-all-part-1/

ORCHIDACEAE; ORNAMENTAL PLANTS; FARMS; FARM MANAGEMENT; COSTS; CROP MANAGEMENT; PLANT ESTABLISHMENT; PHILIPPINES

Software engineers establish farm to earn profit and faster food security. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 33-34. 2021.* https://agriculture.com.ph/2020/09/28/software-engineers-establish-farm-to-earn-profit-and-foster-food-security/

FARMS; RURAL AREAS; TOURISM; FARMING SYSTEMS; VEGETABLE CROPS; FRUIT TREES; LIVESTOCK

Taking the road less travelled prompted a couple to buy a lot and start their own Filipino dream of farming. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 25-26. 2021.* https://agriculture.com.ph/2020/11/09/taking-the-road-less-travelled-prompted-a-couple-to-buy-a-lot-nearby-and-start-their-own-filipino-dream-of-farming/

FRUIT TREES; VEGETABLE CROPS; FARMING SYSTEMS; RURAL AREAS; TOURISM; PHILIPPINES

E40 - COOPERATIVES

Agro-enterprise development in Murcia, Negros Occidental [Philippines]. **Pajarillo, A.O., Cardova, J.A.G., Etchon, M.O., Dogeno, L.A.G., Seville, C.U. Philippine Rice Research Inst., Cansilayan, Murcia, Negros Occidental (Philippines). cu.seville@philrice.gov.ph.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 163-164. 2019.*

Small-hold rice farming households are generally poor because of insufficient farming resources and lack of technical assistance and market access. These constraints hold a significant impact to farmers' livelihood since almost of them live in subsistence lifestyle. Generally, marginalized farmers were taken out from the market system even in their huge production involvement while the rice traders/middlemen are the ones gaining. To address this, Rice Business Innovations Systems (RiceBIS) program was established to help increase farmer's yield, lower their production cost, and link them to business development service providers. Consequently, one of its output is to develop and agroenterprise targeting small rice-based farming households in Negros Occidental [Philippines] through providing them with better income opportunities through market participation. This study started in 2017 as farmers from Farmers' Irrigator Association in Sitio Sumbingco, Brgy. Damsite, Murcia, Negros Occidental were trained in rice production and in business. They are grouped into three (3) cluster namely Angelica, Bordagol and Calatrava as each cluster is composed of 13-15 members engaging in marketing of fresh palay since initially, they' re still hesitant in selling milled rice. In the succeeding year, the group was engaged to active participation on group marketing and correspondingly applied for Cooperative Development Authority (CDA) registration. To facilitate the group's endeavour, a Brown Rice Processing Complex was given by the program's partner agency, PHilMech. Ultimately, the group has been officially transitioned into a cooperative in May 2019 bearing a name of 'RICEBIS Negros Agrarian Reform Cooperative (RICEBISNARCo)'. The cooperative is the first in the island as the only business that focuses in selling brown rice with the brand, Murciana: Ang brown rice nga tatak Negrense and with the following variants: Pinawa Red, Brown and Black. After a 3-year implementation, the data states a 72.92% income increase of involved farmers.

RICE; SMALL ENTERPRISES; MARKETING; MARKETS; COOPERATIVE ACTIVITIES; COOPERATIVES; PHILIPPINES

Empowering rice-based farm communities towards sustainable enterprise: the case of Pinagbuklod Coop in Zaragosa, Nueva Ecija [Philippines]. **Abilgao-Ramos, R.G., Ballesteros, J.F., Labargan, E.S.A. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Rice Chemistry and Food Science Div. Miguel, R.B. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Technology and Management Services Div. Mataia, A.B. Philippine Rice Re search Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Socioeconomics Div. Corales, A.M. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Technology and Management Services Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 172-173. 2019.*

The Rice Business Innovation System (RiceBIS) Program of the Philippine Rice Research Institute aims to transform farming communities into market-driven agro-enterprise for improved competitiveness. This study focused on adding value to rice and other rice-based commodities for enhanced income among rice-based farm households in Zaragoza, Nueva Ecija. A focus group discussion (FGD, n=15) was made to determine the agricultural commodities produced by the community and to generate rice-based product ideas, which were then screened, developed, and test marketed by the participants and product developers. Consumer sensory evaluation (n=30) measured the acceptability of the products. FGD results showed that mung bean was produced by most of the farmers before rice cropping but found difficult to market. Of the product ideas generated, rice and mung bean brew were developed and packaged. Members were trained to create and pack these products and were test marketed during a Farmers' Fair, and all products (rice brew=44 packs, mung bean=42 packs) were sold out at Php15 each (three tea bags of brew/pack). Sensory evaluation showed that rice brew obtained the highest overall acceptability score (OAS) of 4.1 (1-do not like at all to 5=like extremely) and acceptability index (AI) of 80%-84.6% from the respondents (x=36.9 y/o) followed by mung bean brew (OAS=3.4; Al=64.669.4%). An Al of greater or equal to 70% means that a product is acceptable in terms of its sensory attributes. Majority of the evaluators were willing to buy the rice brew (82.4-92.3%) and mung bean brew (53.9-70.6%) once available in the market. Initial results suggest that creating sustainable agro-enterprise can be done effectively by empowering the community through participatory, community-focused, and customer-driven approaches. Post-intervention evaluation must therefore be conducted to measure impact and contribution to its hyperlocal economy.

ORYZA SATIVA; RICE; RURAL COMMUNITIES; COOPERATIVE ACTIVITIES; COOPERATIVES; ENTERPRISES; PHILIPPINES

E50 - RURAL SOCIOLOGY AND SOCIAL SECURITY

Building a sustainable social enterprise in the upland communities of North Cotabato [Philippines]. **Corales, A.M. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Technology Management Services Div. am.corales@philrice.gov.ph., Tabolin, E.H., Mama, S.S. Philippine Rice Research Inst., Midsaya, North Cotabato (Philippines). Baltazar, M.A.M. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Edraira, J.O., Grandual, M.B., Abdulkadil, O.H., Torreña, P.S., Abdula, S.E. Philippine Rice Research Inst., Midsaya, North Cotabato (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View

Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 166. 2019.*

North Cotabato [Philippines] is one of the food baskets in Mindanao because the area is suitable for growing a variety of crops. But the area is also one of the ten poorest provinces in the country with a 44.8% rate of poverty incidence. A big portion of the province is classified as upland with a suitable agroecology for the production of Dinorado rice, a pigmented and aromatic variety believed to have its origin in North Cotabato. Over the years, the market demand for Dinorado has increased but productivity remains low. Improving the productivity and profitability of Dinorado rice as a social enterprise offers an opportunity to improve the economic and social well-being of upland communities. In 2017, a participatory approach to develop a community-based rice-based enterprise with Dinorado as major product was conceived. A Site Working Group (SWG) comprised of the PhilRice, USM, DA-RFO 12, DTI, DAR, CDA, and PCIC was formed to reinforce the provision of support in catalyzing the development process. Twenty (20) farmer-clusters (8 in Alamada and 12 in Banisilan, North Cotabato) composed of 726 farmers covering 1,357ha participated in the project. Farmers' Field School (FFS) with Technology Demonstration Farm as learning field were established resulting to average yield increment of 0.43 t/ha in Alamada and 0.03t/ha in Banisilan. Market scanning identified 30 potential markets with preferred product classification, demand, packaging, delivery, and price dynamics. A total of 2,997kg of polished and unpolished Dinorado amounting to approximately Php 200,00 was sold during test marketing. The farmer-clusters were able to consolidate 278 bags of palay for seeds and milling purposes, and for roll-over. Presently, five (5) farmer-technicians were tapped and being trained to ensure their social enterprise is sustained even if the project is over.

ORYZA SATIVA; VARIETIES; FARMING SYSTEMS; TECHNOLOGY; ENTERPRISES; RURAL COMMUNITIES; HIGHLANDS; SOCIAL PARTICIPATION; PROFITABILITY; MARKETING; PHILIPPINES

Building the capacities of marginalized women towards community-based climate change adaption: an evaluation of the Edible Landscaping training in Surigao del Norte, Philippines. **De Guzman, R.P. rpdeguzman@up.edu.ph., edible_landscaping@yahoo.com., Sanchez, F.C. Jr., Apacionado, B.V., Balladares, M.C.E., Medina, N.G., Tayoborgi, R.R.P., Torres, R.O. torresremuel@gmail.com.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 166-167. 2019.*

The art and science of edible landscaping (EL) technology involves the utilization of sustainable and organic-based agricultural practices, hence not only addressing the 'zero hunger' objective of millennium development goals (MDGs) but also providing a climate change adaptive mechanism. In this regard, a series of trainings on edible landscaping was conducted as part of a DA-BAR funded project in three different sites in the Philippines, one of which is among the marginalized group of women in the province of Surigao del Norte [Philippines]. By incorporating the participation of institutions as stakeholders, the project serves as a community-based approach in addressing the issues of food security in the context of climate change, especially in vulnerable areas such as the municipality of Claver, a coastal town with mining as its main economic activity. In order to determine the effectiveness of the training conducted among the women, this study utilized the first two levels of Kirkpatrick's model (1998) of evaluation, namely reaction, and learning levels. Results have shown that the women have demonstrated a significant increase in knowledge about edible landscaping and its aspects. Furthermore, all of the participants have also expressed intention to apply the knowledge they gained at the training. Also, 93.33 percent of them perceived the training as a success, and 100 percent had confidence that they could apply what they have learned. Nonetheless, the participants have also reported challenges faced during the training, one of which is difficulty of understanding some of the more technical aspects of the technology. Still, the knowledge gained, as well as the confidence, and the willingness of the trained women in applying EL have provided the starting point for their community by which they can address the threatening consequences of climate change, at the same time being food self-sufficient atleast in the household level.

VEGETABLE CROPS; LANDSCAPING; TECHNOLOGY; DIFFUSION OF INFORMATION; TRAINING PROGRAMMES; WOMEN; CLIMATIC CHANGE; ADAPTATION; PHILIPPINES

Determinants of Philippine Health Insurance Corporation (Philhealth) coverage and benefit utilization. **Ricamata, C.P., Tandang, N.A. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics.** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 12-24. 2017.*
https://jhes.uplb.edu.ph/articles/determinants-of-philippine-health-insurance-corporation-philhealth-coverage-and-benefit-utilization/

The World Health Organization (WHO) encourages every nation to implement a Universal Health Care (UHC) system that would ensure that every citizen is granted with affordable and quality health care services. In the Philippines, UHC was integrated into the National Health Insurance Program (NHIP) through PhilHealth, a program that provides health insurance to every citizen in the country. Accordingly, the determinants of coverage and benefit utilization of PhilHealth members were identified using the National Demographic and Health Survey 2013 data. Significant predictors of coverage, in-patient benefit

utilization, and out-patient benefit utilization were determined using stepwise and weighted logistic regression. Results showed that coverage was influenced by the household member's socio-demographic characteristics, relationship to household head, and region, while age, among all other variables, was found to be the only significant determinant of in-patient benefit utilization. Out-patient benefit utilization, on the other hand, was found to have five determinants: (1) time it takes to travel from house to the health facility, (2) consultation place, (3) consultation cost, (4) wealth index, and (5) reasons for visiting health facilities. Further analyses showed that only 61% of the population are covered by PhilHealth, misclassifications exist in its current membership system, and that both in-patient and out- patient benefits have low utilization rates.

HEALTH; HOUSEHOLDS; HEALTH INSURANCE; HEALTH POLICIES; HEALTH SERVICES; PHILIPPINES

Municipal agricultural support in the Philippines: has devolution led to locally responsive performance? **Lapitan, A.V. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Rejesus, R.M. North Carolina State Univ. (USA). Dept. of Agricultural and Resource Economics.** *SEARCA Agriculture and Development Notes (Philippines). 2225-9694; 2599-3860. v. 9 (6) p. 1-4. 2021.*
https://www.searca.org/pubs/briefs-notes?pid=494

RURAL DEVELOPMENT; SOCIAL SERVICES; ADMINISTRATION; DEVELOPMENT POLICIES; AGRICULTURAL DEVELOPMENT; ECONOMIC GROWTH; PHILIPPINES

Public Expenditure Review of Social Protection Programs in the Philippines. **Sicat, C.J.D. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Virata School of Business. Mariano, M.A.P. United States Agency for International Development (Philippines). Protect Health Project.** *PIDS [Philippines Institute for Development Studies] (Philippines). Reseasch Paper No. 2021-01. 1908-3297; 2508-080. 61 p. 2021.*
https://www.pids.gov.ph/publication/research-paper-series/public-expenditure-review-of-social-protection-programs-in-the-philippines

In a developing country such as the Philippines, social protection is crucial in providing support to the poor and vulnerable. There has been recent progress in the design and delivery of social protection programs, owing largely to a more coherent social protection strategy and framework introduced in 2009. Efforts to consolidate programs and improve their targeting, design, and implementation are well documented. In addition, social protection programs were believed to have contributed to an observed reduction in poverty and in equality. However, more work is needed to increase the coverage, as well as improve implementation and coherence of social protection policy. This paper aims to

provide an overall view of national government social protection expenditures in the Philippines. Public expenditure trends in social protection were examined with emphasis on selected major programs. Social protection efforts in the Philippines were compared with these in other countries and a review of existing literature on current social protection programs in the country was made to guide policymakers in rethinking either the design or the existence of these programs. The paper concluded with recent developments in social protection policy that could be continued to further the gains of social protection efforts in the last decade.

PHILIPPINES; GOVERNMENT; SOCIAL POLICIES; PUBLIC EXPENDITURE; DEVELOPMENT PROJECTS

Seismic audit of important UPLB [University of the Philippines Los Banos] buildings towards an earthquake resilient campus. **Zafra, R.G. Philippines Univ. Los Banos, College, Laguna (Philippines). Dept. of Civil Engineering.** Dr. Senen M. Miranda Professorial Chair in Civil Engineering. Via online (Zoom meeting platform). 30 Sep 2021.

The seismic hazard potential brought not only by the West Valley Fault but by other active faults in the region poses an urgent need to conduct a seismic audit of important UPLB buildings. The study summarizes the results of the preliminary seismic audit of academic, administration, and service buildings performed based on a previously conducted seismic risk assessment of 67 out of the total 165 UPLB buildings. However, due to the unavailability of structural plans for some of the buildings, thirteen out of 147 buildings deemed to have medium risk were considered. The buildings were evaluated for a Life Safety performance level except for the UHS Main Building which was evaluated for Immediate Occupancy performance level. Based on the results of the study, most of the audited buildings built before 1977, considered as pre-code buildings, have structural elements that did not pass the required performance level. The two audited buildings built after 1992, considered as benchmark buildings, have passed the required performance level. The two audited buildings built after 1992, considered as benchmark buildings, have passed the required performance level may need retrofit of columns, beams, and foundation. Because of the limitations of the analysis (i.e. assumed material properties not verified by destructive/non-destructive tests, soil type assumed to be Soil Type D for the entire UPLB campus), the buildings with identified deficiencies can be prioritized for financial assessment taking into account the results of material and geotechnical investigations. The results of the seismic audit can be used in the preparation of an earthquake disaster mitigation plan of the university that should be put into place to make campus buildings safe in earthquakes and more resilient to earthquake damage and disruption.

EARTHQUAKES; DISASTER PREPAREDNESS; DISASTER PREVENTION; BUILDINGS; EDUCATIONAL INSTITUTIONS; PHILIPPINES

Transportation and health infrastructures impact on population growth of Calauan, Laguna, Philippines. **Javier, C.G. Metro Manila Development Authority, Makati City (Philippines). Metropolitan Development Planning Services. Roxas, E.D., Abucay, E.R., Salvacion, A.R. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Community and Environmental Resource Planning. arsalvacion@up.edu.ph.** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 25-40. 2017.*
https://jhes.uplb.edu.ph/articles/transportation-and-health-infrastructures-impact-on-population-growth-of-calauan-laguna-philippines/

Studying the determinants of population growth is vital in planning communities to help planners and decision makers. This study was conducted to assess the transportation and health infrastructures as determinants of human population growth in the municipality of Calauan, one of the most populous and fastest annual population growth in Laguna, Philippines. The study analyzed the relationship of distance to public roads and networks and health infrastructures from human settlements with respect to barangay [village]-level population growth in the municipality. Results showed that the average spatial proximity to all types of roads, primary roads and municipal health center have a positive relationship with respect to the population growth. The proportion of health workers is inversely proportional to the population growth. Between transportation and health infrastructure variables, the latter were tested to be significant determinants of population growth in the municipality.

POPULATION GROWTH; TRANSPORT; HEALTH; INFRASTRUCTURE; PHILIPPINES

E70 - TRADE, MARKETING AND DISTRIBUTION

Agro-enterprise development in Murcia, Negros Occidental [Philippines]. **Pajarillo, A.O., Cardova, J.A.G., Etchon, M.O., Dogeno, L.A.G., Seville, C.U. Philippine Rice Research Inst., Cansilayan, Murcia, Negros Occidental (Philippines). cu.seville@philrice.gov.ph.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 163-164. 2019.*

Small-hold rice farming households are generally poor because of insufficient farming resources and lack of technical assistance and market access. These constraints hold a significant impact to farmers' livelihood since almost of them live in subsistence lifestyle.

Generally, marginalized farmers were taken out from the market system even in their huge production involvement while the rice traders/middlemen are the ones gaining. To address this, Rice Business Innovations Systems (RiceBIS) program was established to help increase farmer's yield, lower their production cost, and link them to business development service providers. Consequently, one of its output is to develop and agroenterprise targeting small rice-based farming households in Negros Occidental [Philippines] through providing them with better income opportunities through market participation. This study started in 2017 as farmers from Farmers' Irrigator Association in Sitio Sumbingco, Brgy. Damsite, Murcia, Negros Occidental were trained in rice production and in business. They are grouped into three (3) cluster namely Angelica, Bordagol and Calatrava as each cluster is composed of 13-15 members engaging in marketing of fresh palay since initially, they' re still hesitant in selling milled rice. In the succeeding year, the group was engaged to active participation on group marketing and correspondingly applied for Cooperative Development Authority (CDA) registration. To facilitate the group's endeavour, a Brown Rice Processing Complex was given by the program's partner agency, PHilMech. Ultimately, the group has been officially transitioned into a cooperative in May 2019 bearing a name of 'RICEBIS Negros Agrarian Reform Cooperative (RICEBISNARCo)'. The cooperative is the first in the island as the only business that focuses in selling brown rice with the brand, Murciana: Ang brown rice nga tatak Negrense and with the following variants: Pinawa Red, Brown and Black. After a 3-year implementation, the data states a 72.92% income increase of involved farmers.

RICE; SMALL ENTERPRISES; MARKETING; MARKETS; COOPERATIVE ACTIVITIES; COOPERATIVES; PHILIPPINES

Change the game: improving farmers access the market for an innovative and sustainable rice-based community agro-enterprises. **Miguel, R.B., Mataia, A.B. ab.mataia@philrice.gov.ph., Corales, A.M. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Agronomy Soils and Plant Physiology Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 167-168. 2019.*

The Rice Business Innovation Systems (RiceBIS) Community Program aims to develop a model of a community transformation that will improve the income of farmers. Unlike the conventional technology transfer approaches which are production-driven, this research draws more on improving farmers' access to markets through collective marketing, better marketing engagement, and strong strategic collaboration. This study aimed to improve farmers' access to market for an innovative and sustainable rice and rice-based community agro-enterprises. Rapid Area Assessment (RAA) and series of FGDs were done to assess the

resources available in the area. Among the products identified for test marketing include value-added rice-based products: packaged premium milled rice, brown rice, rice brew, and mungbean brew. Stakeholders/site working groups within rice cluster were formed who will help in the implementation and sustainability of the community enterprise. Capitalizing on a competitive branding and packaging samples, these products were sold and test marketed during a Farmers' Fair. Most products were sold out and bulk pre-orders were made during the event. Subsequently, series of market/supply chain study was conducted to identify potential end markets as well as assess product demand. This was done through a survey on 10 institutional and business establishments including hospital canteens, local restaurants, schools, pasalubong centers, etc. With this undertaking, 6 possible markets/buyers were identified and majority of the business establishments were willing to buy the farmers' products once available in the market. Majority of the respondents portrayed high interest of buying products directly from farmers for social benefits. Intervention result suggests that with the right access to market combined with compelling social branding, and strategic collaborations, farmers' access to market will be strengthened which leads to a significant improve in income. This strategy transforms small group of farmers to become successful agripreneurs which essentially brings economic growth to rural farming communities.

ENTERPRISES; FARMERS; MARKETING; MARKETS; RICE

Establishing fair-trade market by optimizing the food value chain. **Sison, H.J. Seasons Farms (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 3. 2019.*

The food value chain of developing nations like the Philippines is feudal to a point and riddled with inefficiencies. We offer an optimized value chain enabled by a digital platform allowing small landholder farmers to organize and collectively operate as a larger, more sustainable business. Agriculture is an industry where the laws of supply and demand favour economics of scale and by default, small landholder farmers are always at a disadvantage. One way to tilt the balance in favour of farmers is to organized groups i.e. association or cooperatives organized groups have better leverage and are definitely more sustainable compared to farmers who choose to work alone. It is under this pretext that our digital platform, Agro-Digital PH, is conceptualized and designe d to support small farmer organizations. Agro-Digital PH deliberately empowers organized groups to transact directly with the market sans the middleman margin overheads. Agro-Digital PH integrates various applications that take a farmer though the stages of the value chain i.e. from demand capture and analysis (what to produce), order allocations (who produces), production

planning and management (production guarantee), logistics (how produce reaches the customer, and order fulfillment and settlement (how transactions are consummated i.e. customers get t he produce, farmers get paid). The solution is designed to shepherd farmers through each phase of the value chain. Furthermore, the digital platform is extensible to accommodate production management tool sets such as AI and machine learning on growing protocols and disease management as well as geomapping for location-based data.

MARKETS; TRADE LIBERALIZATION; MARKETING CHANNELS; MARKET RESEARCH; MARKETING

E73 - CONSUMER ECONOMICS

Analyzing consumer preferences for credence attributes of fish and fishery products in Davao City, Philippines. **Castro, M.M.C. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. mccastro9@up.edu.ph., Pabuayon, I.M., Catelo, S.P., Camacho, J.V. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Economics and Management.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 18 (1) p. 83-103. 2021.*
https://ajad.searca.org/article?p=1285

Fish remains among the essential diet components in a typical Filipino household. As fish consumption rises, the manner of how it is caught is in question as it affects the quality of the fish. This study aims to analyze the importance of the two credence attributes of environmental sustainability and food safety in fish and fishery products in Davao City, Philippines. Conjoint analysis was used to analyze consumer preference by estimating the consumer's utility function. From the preference model, the relative importance of the considered attributes in descending order are food safety certification, sustainability practice information, and the extent of good animal welfare for target and non-target species. Three major segments of seafood consumers (N = 300) were clustered in terms of policy preferences. These are consumers who preferred policies on food safety certification and traceability system (77%), consumers who preferred policies regarding food safety certification and environmental sustainability certification (16%), and consumers who highly preferred only food safety certification (7%). Using multinomial logistic regression, the factors affecting preferences were found to be average price per kilogram for capture fishery products, barangay (i.e., village) classification, household size, retail outlet choice, sex, frequency of buying, beliefs and practices regarding environmental sustainability and environmental concerns, age, years of education, and frequency of buying fish. The study showed the potential of environmental sustainability and food safety attributes in influencing the purchasing decisions of consumers.

FISH; CONSUMER BEHAVIOUR; ENVIRONMENTAL IMPACT; FOOD SAFETY; SUSTAINABILITY; PHILIPPINES

Consumer purchasing behavior for fresh soursoup (Annona muricata L.): evidence from Metro Manila and CALABARZON [Cavite, Laguna, Batangas, Rizal, Quezon] Philippines. **Del Carmen, D.R. drdelcarmen@up.edu.ph., Esguerra, E.B., Gerance, A.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Postharvest Training and Research Center.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 132-139. 2020.*

A survey of urban and peri-urban consumers in major market centers and residential estates in Metro Manila and CALABARZON [Cavite, Laguna, Batangas, Rizal, Quezon] in the Philippines was conducted to determine their purchasing behavior for fresh soursop as influenced by demographic characteristics and preferences. Household income, education and household size were strongly correlated with consumer preference on soursop attributes. As household income increased, consumers tended to look for more desirable attributes which can be classified into search (size, color, peel thickness) and experience (taste, juiciness and pulp texture). Education had a similar influence but to a lesser extent. Consumer household size and fruit size also showed marked correlations, indicating that larger households (those with more members) bought larger fruits. Using cluster analysis, two consumer segments, the size/shape conscious and the taste-discriminating groups were identified. Majority of the consumers were nor satisfied with the soursop purchased due to quality defects such as pulp hardening, sour or off-taste, and fruits that did not ripen and fruits with insect/disease damage, which had an adverse impact on their repeat purchase. Moreover, the resulting losses from fruits with defects also impacted on income of stakeholders, particularly the farmers and traders. Quality improvements in the soursop supply chain can, therefore, be undertaken to provide the quality of fruits that will satisfy the different types of consumers, and to reduce losses to increase income of farmers and traders.

ANNONA MURICATA; CONSUMER SURVEYS; CONSUMER BEHAVIOUR; CONSUMER EDUCATION; PARTICIPATION; FOODS; QUALITY; HOUSEHOLDS; INCOME; URBAN AREAS; PHILIPPINES

Tasty and healthy: how consumers view mushroom and mushroom-based products. **Manaois, R.V., Ballesteros, R.F., Morales, A.V. av.morales@philrice.gov.ph., Abilgos-Ramos, R.G. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Rice Chemistry and Food Science Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines

Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 179. 2019.*

Production and processing of mushroom is widely promoted in the Philippines due to its potential in providing high quality food and additional income to farmers, local entrepreneurs, and consumers. To further enhance the marketability of mushroom in Central Luzon, this study explored consumers' perception, awareness, and purchasing behavior towards mushroom and mushroom-based products. Market survey (n=222) through personal interview was conducted in one rice-based farming community located in each of the following provinces: Aurora, Bulacan, Nueva Ecija, and Pampanga. The study group had a mean age of 46 years and 51% were women. More than half (65%) of the respondents were married, 42% reached high school level, and 40% were farmers. Survey results showed that taste and nutritional/health benefit were the attributes that had the greatest influence on consumers' decision to purchase mushroom. These were also cited as reasons of 98% of the respondents for liking mushroom. However, only 27% consume it on a regular basis, i.e. once or twice a week, due to limited availability of the commodity. When presented with a list of product concepts, majority of the consumers selected mushroom-based food supplement, coffee/tea, and cookies and other ready-to-eat snacks as highly appealing products. These findings suggest future strategies on marketing mushroom and product development opportunities in rice-based areas in Central Luzon to further maximize its health-promoting and profit potential.

EDIBLE FUNGI; MARKET RESEARCH; MARKETING; FOOD TECHNOLOGY; CONSUMER BEHAVIOUR; PROCESSED PRODUCTS

F - PLANT SCIENCE AND PRODUCTION

F01 - CROP HUSBANDRY

After 30 years, a farmer now owns three gardens and provides jobs amid crisis. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p.29-31. 2021.* https://agriculture.com.ph/2020/07/30/after-30-years-a-farmer-now-owns-three-gardens-and-provides-jobs-amid-crisis-part-1/

VEGETABLE CROPS; FLOWERS; FARMS; LANDSCAPING; CROP MANAGEMENT; CROPS; DOMESTIC GARDENS

Agritourism strengthens communities through sustainable agriculture. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25(4) p. 44-48. 2021.*

VEGETABLE CROPS; LIVESTOCK; CHICKENS; FARMS; FARMING SYSTEMS; RURAL AREAS; TOURISM; SOCIAL PARTICIPATION; COMMUNITY INVOLVEMENT

Assessing the performance of climate smart rice production systems in the upper part of the Vietnamese Mekong River Delta. Khoi, D.K. Vietnamn National Agricultural Univ., Ha Noi (Vietnam). **Agricultural Market and Institution Research Inst. khoidk@gmail.com., Thu, D.M. Institute of Policy and Strategy for Agricultural and Rural Development, Ha Noi (Vietnam). Lien, L.T.H., Ninh, N.T.T. University of New England, Armidale (Australia). Thinh, P.D., Thiep, D.H., Dat, N.S. Vietnamn National Agricultural Univ., Ha Noi (Vietnam). Agricultural Market and Institution Research Inst. Ngoc, V.T.B., Anh, N.P. Institute of Policy and Strategy for Agricultural and Rural Development, Ha Noi (Vietnam).** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 18 (1) p. 15-29. 2021.*

Climate smart agriculture (CSA) has gained considerable attention in Vietnam due to its potential to increase food security and farming system resilience while decreasing greenhouse gas emissions. In recent years, several CSA practices have been introduced in rice production, the most important sub-sector of Vietnam's agriculture. However, few studies have been done in Vietnam to produce comprehensive assessments of CSA performance in the rice sector. This research proposes a comprehensive approach to assess CSA practices through a new set of evaluation indicators. A case study in An Giang province of the Vietnamese Mekong River Delta was implemented to evaluate the performance of five CSA models versus that of the triple rice crop system (i.e., benchmarking model). Results show that rice-shrimp and rice-lotus rotations are most profitable, low-risk, and applicable at a larger scale. Given that the current study analyzed and calculated only a small number of indicators and types of CSA practices, further research is necessary to test all indicators and diversified types of CSA models.

ORYZA SATIVA; FARMING SYSTEMS; CROP PERFORMANCE; PRODUCTION; CLIMATIC CHANGE; ADAPTATION; MEKONG RIVER; VIET NAM

Baseline assessment of the informal soybean farming system in the Philippines. **Atienza, V.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development. Dinglasan, A.A. ally.dinglasan@gmail.com., Enicola, E.E. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Aquino, A.L., Malayang, J.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Makiling, F.C. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao,

City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 165. 2019.*

The informal sector is composed of farmers that normally operates individually and relies on indigenous knowledge and resources in managing their farms. Several studies have proven the significant roles of this sector but they are often neglected by the government. This study hopes to develop social sustainability mechanisms that would enhance the informal seed system. A baseline study was conducted through the conduct of surveys and personal interviews with 185 informal soybean farmers in the provinces of Bukidnon, Surigao del Sur, Agusan del Sur, Davao Oriental, Isabala, and Quirino [Philippines] in 2018. Based on the preliminary results of the survey, the common challenges encountered by the farmers were the limited or unavailability of good quality seeds for planting, lack of farming equipment and technologies to improve their farming practices, and the lack of markets for their produce. However, the results also showed that they are several opportunities on how the system of the informal soybean sector can be improved. Based on the surveys, most of the farmers in the study sites are members of the organization in their area. In addition, it was also observed during the field visits, most farmers expressed willingness to improve their soybean farming practices. Hence, the following interventions are proposed: a) strengthening the existing farmer's cooperatives/organizations through capacity building (i.e. provision of technical assistance/trainings/livelihood tranings with lectures, demo, field visits) to empower the farmers and eventually improve their farming systems and practices; b) linkage of the people's organization and farmer's organization to possible partners such as the national agencies (i.e., DA, DTI, etc.), LGUs, NGOs, private/business, academe/research sector; and c) policy recommendations to enhance the informal soybean seed sector.

GLYCINE MAX; SOYBEANS; SEEDS; FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; PHILIPPINES

Batangas [Philippines] family forum still finds success in small-scale operations. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 20-23. 2021.*

VEGETABLE CROPS; FRUIT TREES; INDIGENOUS ORGANISMS; FARMS; RURAL AREAS; TOURISM; DIFFUSION OF INFORMATION; EXTENSION ACTIVITIES; PHILIPPINES

Bougainvillea the flower of the Philippine summer. **Mendenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 38-39. 2021.*

ORNAMENTAL PLANTS; BOUGAINVILLEA; CROP MANAGEMENT; GARDENING; CUTTINGS; PHILIPPINES

Bukidnon [Philippines] plant nursery in the bread and butter of its founding family. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 52-54. 2021.*

FRUIT TREES; FOREST TREES; PLANT PROPAGATION; CROP MANAGEMENT; PLANT NURSERIES

Businessman built an urban farm by upcycling over 1000 plastic bottles. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 51-52. 2020.* https://agriculture.com.ph/2020/08/13/a-businessman-built-an-urban-farm-by-upcycling-over-1000-plastic-bottles/

VEGETABLE CROPS; PLANTING; CROP MANAGEMENT; CROPS; GARDENING; FARMS; DOMESTIC GARDENS; URBAN AGRICULTURE; BOTTLES; RECYCLING

Cancer survivor credits gardening with contributing to recovery. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p. 54-56. 2021.* https://agriculture.com.ph/2020/08/04/a-cancer-survivor-recovered-through-the-help-of-gardening/

VEGETABLE CROPS; FRUIT TREES; ORNAMENTAL PLANTS; FARMS; CROPS; CROP MANAGEMENT; GARDENING; DOMESTIC GARDENS

Crop production practices among lowland rice farmers in Guimaras Island [Philippines]: an assessment. **Flora, R.J.D., Paglomutan, R. Guimaras State Coll.-Baterna Camps, Constancia, San Lorenzo, Guimaras (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 36. 2019.*

This study was conducted last December 2018 within the clustered soil fertility sites of the Bureau of Soil and Water Management (BSWM) in the whole Province of Guimaras [Philippines]. The study utilized a total of 500 respondents equally distributed from the five municipalities. Majority of the respondents are males with ages ranging from 61 years old and above, married, elementary school graduates, have 0-1 dependents, owned their farm, have a total farm area members of the rice cluster association. Majority of them manage their farms under rainfed condition, plant certified inbred rice varieties and use hand tractor in preparing their farms. In the farm, plowing and harrowing, and crop establishment. Most of the farmers observe fallow period of 3-4 months and have no bases for fertilizer application. All respondents practice chemical application for controlling

weeds, pests, and diseases. Majority of the farmers practice chemical application for controlling weeds, pests and diseases. Majority of the farmers practice composting of rice straws. They also identified problems such as pests and diseases, followed by capital and adverse climatic condition. Other problems included high cost of farm inputs while very few responded that they have problems on fertilizer sources. In terms of soil fertility, majority of the farmers practice composting of rice straws. They also identified problems such as pests and diseases, followed by capital and adverse climatic condition. Other problems included high cost of farm inputs, while very few responded that they have problems on fertilizer sources. In terms of soil fertility, majority of the respondents farms were low in nitrogen, low in phosphorous (95%), moderately high in potassium (84%), and high in soil pH (66%). In terms of general fertility, the 94% of the farms have moderately low fertility.

RICE; LOWLAND; PLANT PRODUCTION; TECHNOLOGY; SOIL FERTILITY

Cultivating a food forest: Bohol [Philippines] permaculture farm produces award-winning tablea. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p. 34-39. 2021.* https://agriculture.com.ph/2020/12/13/bohol-permaculture-farm-is-also-home-to-award-winning-tablea-part-1-cultivating-a-food-forest/

THEOBROMA CACAO; VEGETABLE CROPS; FRUIT TREES; FARMING SYSTEMS; FARMS; CROP MANAGEMENT; CROPS; PLANT PRODUCTION; FOOD TECHNOLOGY; MARKETING; PHILIPPINES

Data analysis for a multi-purpose farmers' cooperative in Bukidnon [Philippines] nurtures Queen of the Night in his garden. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 18-19. 2021.*

CACTACEAE; ORNAMENTAL PLANTS; PLANTING; DOMESTIC GARDENS; PHILIPPINES

Development of Modified Dapog Technology version for heirloom rice production in the Cordillera [Philippines]. **Batcagan, J.D., Credo, R.M.S., Rocabo, V.S. Philippine Rice Research Inst., Malasin, San Mateo, Isabela (Philippines). Isabela Branch Station. Ilar, G.Y., Concepcion, M.S. Philippine Rice Research Inst. Central Experiment Station, Maligaya, Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 181. 2019.*

Heirloom Rice (HR), being produced in the highland terraces by the Indigenous People of the Cordillera, has outstanding quality, aroma, texture, color, taste, and nutritional value

which can compete in niche markets both locally and internationally. Despite its resilient physiognomies, production is being limited by biotic and abiotic constraints that need to be addressed. The development of suitable and location specific version of technologies is necessary to augment lacks in the natural system of farming. The introduction of Modified Dapog Technology in heirloom rice production aims to improve seedling management practices. It promotes transplanting of younger seedlings for enhanced tillering, and for faster and easier uprooting which reduce seedling stress. To develop a localized version, ten Participatory Technology Demonstration (PTD) sties were established in various sites in Cordillera. The study focused in determining the optimum seeding rate for a specific seedbed area as basis in packaging the technology. Three seeding rate treatments at 340 g/m2, 230 g/m2, and 680 g/m2 (lowland recommendation) were used. The lowland recommendations must have to be adjusted for the reasons that: a. traditional varieties have long maturity meaning longer growth period at the seed bed and b. they differ in the number of grains per unit of weight. Results show that seedlings from the 230 g/m2 plot have the best qualities in terms of height, roots, and leaf blades. Also, it was observed that the presence of the net and Carbonized Rice Hull (CRH) layer prevented low germination or weak culm of surviving seedlings as caused by soil/cast deposits of aquatic worms require 9-12 kilograms seeds to be sown in a 50 m2 Modified Dapog Seedbed.

ORYZA SATIVA; INDIGENOUS ORGANISMS; SOWING; SOWING RATES; TECHNOLOGY; TECHNOLOGY TRANSFER; PHILIPPINES

Development of mushroom production technology to increase farmers' income in the Philippines. **Tabil, Ma.A.U. Philippine Rice Research Inst., Malasin, San Mateo, Isabela (Philippines). Ha, W. Korea Programan International Agriculture BPI Compound, Los Baños, Laguna (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 168-169. 2019.*

Korea Program on International Agriculture (KOPIA) is one of the partners of the Philippines in transforming Filipino farmers to be more profitable, resilient and sustainable through responsive, balanced, environmentally sound and partnership-based research, development and extension. The program aims to explore opportunities to enhance farm productivity and household income in rural farming communities. The success of the project will give quality and positive outputs and accomplishments which, in the end, will benefit not just the institution, but most especially the farmers. Three (3) farmers' group were formed in Isabela, Cavite and Bohol [Philippines] and were considered as the beneficiary of the project patterned in the Saemaul Undong (New Community Movement) of Korea following the 3 basic Saemaul spirits: Diligence, Self-help and Cooperation. Mushroom house was

constructed in each site complete with growing house, laboratory, soaking tank and working area. During the first year 2018, 399 farmers, students, government employees, out-of-school youth, stay home mothers and other mushroom enthusiasts were able to attend mushroom production and processing training which is 199.5% of the total target for the first year. Twenty percent (20%) decrease in production cost were taught to farmers by teaching new ways to mushroom production and a 50%-100% farm household income increase. Products produced by farmer members specifically Mushroom chili garlic oil, Mushroom Atsara and Mushroom Bagoong are now registered under the Department of Trade and Industry. New product is being developed in cooperation with the Department of Agriculture RFO2 led by Dir. Rosemary G. Aguino, RTD Research and Regulatory, mushroom powder seasoning which aims to use the mushroom powder as substitute for Magic Sarap and Ajinomoto, a new and healthier way of cooking. Another is the rice - mushroom noodles which can be used to showcase characteristics of pigmented and aromatic rice traditional varieties in addition to the mushroom ingredient.

EDIBLE FUNGI; PRODUCTION; FOOD PROCESSING; TECHNOLOGY; TECHNOLOGY TRANSFER; FARMERS; INCOME; PHILIPPINES

Development of package of technologies for off-season production of mangosteen (Garcinia mangostana Linn.). **Regulacion, A.N., Antiola, R.M., Lutarte, G.M.N., Dolam, M.C. Department of Agriculture Regional Field Office II, Manambulan, Tugbok District, Davao City 8000 (Philippines). Davao Region Central Experiment Station.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 34. 2019.*

The development of package of technologies for off-season production of mangosteen (Garcinia mangostana Linn.) was conducted at Davao Region Central Experiment Station (DARCES). Manambulan, Tugbok District, Davao City [Philippines] from January 2016 to December 2018, to determine appropriate technology that could help increase mangosteen production. The treatments following treatments were used: rain shelter, pruning, plastic mulching, and bark ringing. The control treatment, pruning, plastic mulch and bark ringing of trees, initiated flushing of leaves after experiencing heavy rains in December having the highest precipitation of 238.50 mm. Mangosteen trees covered with rain shelter flowered at 60 days of water deficit. All the upper branches under rain shelter treatment had a high flower induction at about 95% than the lower branches with only 30%. The temperature was also higher on the upper portion of the branch that reached an average noon temperature of 35 degrees Celsius than in the lower portion with an average temperature of 32 deg C. High temperature and water stress may cause the mangosteen trees to induce

flowers especially at the upper portion of the trees where the temperature is high. The microclimate inside the rain shelter was controlled resulting in a drought and higher temperature condition that triggered the trees to induce flowers after 60 days of stress period. Off-season mangosteen fruits had the same fruit size and taste quality from season fruits. It had a yield of 28.85 kg/tree in addition to the season production of 56.68 kg/tree. Based on the result, mangosteen can be managed to induce flower for production. Producing off-season mangosteen is a profitable technology with an income of Php 1,052,740.00/ha or 148% return of income.

GARCINIA MANGOSTANA; MANGOSTEEN; OUT OF SEASON PRODUCTS; PACKAGING

Digital rice farming in the Philippines. **Barroga, R. F. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 2-3. 2019.*

In 2014, the Philippine Rice Research Institute (PhilRice) established the Future Rice farm where the latest innovations from PhilRice, the science community, and the industry were showcased to farmers, extension agents, local government, and students. These innovations were in response to emerging issues on environmental protection, climate change, peak oil, alternative energy, production efficiency, and food safety. Today the farm serves as a test bed of smart farming innovations, precision agriculture, and farm automation. Using practical ICTs and electronics, young IT specialists and students design an array of farm monitoring sensors and controls that automatically collect farm data such as paddy water level, water quality, ammonia gas level, and warehouse environment. These sensors are tied to remote controls for irrigation water gates, drip irrigation, fish feeder. Prototype unmanned tractors and seeders, and drone technology for precision spraying and precision fertilizer application are also being developed and tested in the farm by student and inters, as well as industry partners. To control all these farm gadgets, young programmers have developed a farm dashboard to monitor, enabling the farm owner to remotely monitor and control the farm. To further enable extension agents and young farmers to migrate into digital farming, smart farm apps are continuously being developed to guide farmers in selecting rice varieties, identifying weeds, and recording farm activities and scheduling farm tasks. These apps are now available for download for free. Through digital farming we have reduced the cost of production in rice farming, increased efficiency, and made application of chemicals more precise, making its safer for the farmer and consumers. The Future Rice farm provides valuable lessons to policy makers we join the global agriculture 4.0 environment.

ORYZA SATIVA; FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; PHILIPPINES

Displaced events professional turns to farming after the closure of his business. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 54-57. 2020.*

VEGETABLE CROPS; FRUIT TREES; FARMS; CROP MANAGEMENT; CROPS; HARVESTING; FARMING SYSTEMS; RECREATION

Dragon fruit farm originally meant to treat a special needs individual sparks interest in the town of Burgos, Ilocos Norte [Philippines]. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 20-22. 2021.*
https://agriculture.com.ph/2020/11/30/dragon-fruit-farm-originally-meant-to-treat-a-special-needs-individual-sparks-interest-in-the-town-of-burgos-ilocos-norte-part-1-from-family-farm-to-community-pioneer/

HYLOCEREUS; PLANTING; FARMS; FARMING SYSTEMS; RURAL AREAS; TOURISM; PROCESSING; PROCESSED PLANT PRODUCTS; PHILIPPINES

Dragon fruit farm that started as a hobby is now a budding farm tourism site. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 32-34. 2021.*
https://agriculture.com.ph/2020/08/14/a-dragon-fruit-farm-that-started-from-a-hobby-is-now-a-budding-farm-tourism-site-part-1/

HYLOCEREUS UNDATUS; PLANTING; FARMS; RURAL AREAS; TOURISM

Ecology, ethnobotany, propagation and product development of Bago (Gnetum gnemon Linn.). **Garrigues, M.M. Surigao del Sur State. Univ., San Miguel, Surigao del Sur (Philippines). Garrigues, R.R. Upi Agricultural School, Upi, Maguindanao (Philippines). Coll. of Agriculture.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 33. 2019.*

Diversification of food base and utilization of wild edible plants constitute the backbone of resilience to the changing climate. This research evaluated the population status and ethnobotanical situation of G. gnemon in the wild, explored the different propagation techniques and reviewed novel foods from its leaves and seeds. Field observation, experimentation and modeling: field experiments and survey and hedonic testing were done to obtain data. Results showed that the population abundance of Bago in the wild was very rare and its age structure is irregular. Reasons for these were fortified from the

ethnobotanical review results that 10% of the population from grassroots farmers uses Bago for food, medicine and construction and they sourced the plant only from the wild through unsustainable extraction coupled with its habitat destruction. Treatments for seed germination gave significant results on the development of feeders in 90 days but seedling emergence was not shortened. Promising shoots and callus development results on the two-nodal cuttings of matured green and young brown branch stages were observed even without the application of plant growth hormones in 90 days. Nutritional contents of Bago leaves and seeds powder have good and promising potentials for the development of functional foods that will help address common Filipino nutritional deficiencies. The feasibility of further processing of Bago products and their improvement is high and should be explored further.

GNETUM GNEMON; ECOLOGY; ETHNOBOTANY; PROPAGATION BY CUTTINGS; PRODUCT DEVELOPMENT

Effect of tillage systems on soil properties and yield of wheat and rice in rotation. **Shumin Liang. Yunnan Province Academy of Agricultural Sciences, Kunming Yunnan (China). Industrial Crops Research Inst. Ruizhi Xie Chinese Academy of Agricultural Sciences, Beijing (China). Key Laboratory of Crop Physiology and Production, Ministry of Agriculture. Zhu Zheng. Yunnan Vocational and Technical College of Agriculture, Yunnan (China). Muhammad Abdul Rehman Rashid. University of Agriculture Faisalabad, Subcampus Burewala (Pakistan). Yonglu Tang. Sichuan Academy of Agricultural Sciences, Chengdu, Sichuan (China). Inst. of Crop Science. Yuee Liu. Chinese Academy of Agricultural Sciences, Beijing (China). Key Laboratory of Crop Physiology and Production, Ministry of Agriculture. Jinzhong Yang. Qingdao Agricultural Univ., Quingdao, Shandong (China). Coll. of Agronomy and Plant Protection. Chaosu Li. Sichuan Academy of Agricultural Sciences, Chengdu, Sichuan (China). Inst. of Crop Science. Bing Chen. Xinjiang Academy Agricultural and Reclamation Science, Shihezi (China). Shaokun Li. Chinese Academy of Agricultural Sciences, Beijing (China). Key Laboratory of Crop Physiology and Production, Ministry of Agriculture. lishaokun@caas.cn.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 38-46. 2020.*

Effect of four tillage systems (1) winter wheat and rice rotary tillage (WRRT) (CK), (2) winter wheat and rice no-tillage system (WRNT), (3) winter wheat no-tillage and rice rotary tillage (WNRR), and lastly, (4) winter wheat and rice no-tillage in a raised bed (WRNB) on soil properties and crop yields was investigated in a field experiment in 2004-2010 in a wheat-rice crop rotation on the Chengdu Plain, China. The WRNT system significantly increased the saturated hydraulic conductivity and water infiltration relative to the WNRR and the WRRT (CK) systems. The soil cone penetration resistance was greater in certain soil layers beneath the three systems, compared to the CK system ($P<0.05$). The three tillage systems also

significantly increased soil erodibility K (P< 0.05) and soil organic matter (SOM) (P< 0.05) in certain soil layers but had no significant differences in the soil bulk density, total porosity, and specific gravity among the four tillage systems. Additionally, WNRR improved the wheat yield by 4.0% and rice yield by 8.8% relative to CK.

RICE; WHEATS; CROPPING SYSTEMS; CROP YIELD; CROP ROTATION; PLANT PRODUCTION; SOIL CHEMICOPHYSICAL PROPERTIES; SOIL; CONSERVATION TILLAGE; ZERO TILLAGE; TILLAGE

Evaluation of the Department of Agriculture's Corn Clustering Program implementation in major corn producing provinces in the Philippines. **Gaylican, J.K.M., Del Carmen, D.R., Serrano, N.M.K.P., Piñgol, N.A.S., Nguyen, M.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Postharvest Training and Research Center.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 8-9. 2019.*

The DA's Corn Banner Program in clustered approach, institutionalized in 2010, aimed to increase corn productivity and quality, and reduce losses and production costs to increase farmers' income. The program envisions a more efficient and effective intervention distribution so nearly a decade later clustering was assessed by analyzing program outcomes and integrity. The former relates to accomplishment of intended goals while the latter is defined by adherence, dosage, delivery quality, and participant responsiveness. Program integrity is important but has often been neglected in most program evaluations that focus mostly on outcomes as success indicator, hence this study. Data were gathered in 2017-2018 through interviews with farmers, farmer officers, and DA and LGU implementers from Pangasinan, Isabela, Bukidnon, South Cotabato [Philippines]. In 2011-2017, only South Cotabato exceeded their yield targets by 15% but declined by 7% in value. As for area only Pangasinan exceeded its target by 2% and grew by 20% in value. All perceived no decline in postharvest losses except Pangasinan and South Cotabato. No province adhered to the prescribed program framework for cluster organization and classification. Hence, their status was reclassified--functional or non-functional. In all provinces, members of functional clusters score better outcome indicators. Mann-Whitney showed that beneficiaries under both cluster types receive the same total number of interventions statistically. Furthermore, 32% of respondents reported that among various problems, quality of delivery is affected mostly by lack and mismatch of interventions and 22% attributed difficult implementation to poor cluster officers' performance. The Wilcoxon Signed Rank Test showed that respondents illicit significantly higher participation after clustering (p=0.0001). Thus, beneficiaries were deemed as more participative because interventions increased

dramatically since clustering. Therefore, outcomes and integrity parameters indicate a need to empower local implementers and farmers by streamlining the program budget to extension operating funds and allowances, and easier credit provision.

ZEA MAYS; PROJECT EVALUATION; TECHNOLOGY; TECHNOLOGY TRANSFER; PHILIPPINES

Family driver is also a productive background gardener. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p.42-43. 2021.*

VEGETABLE CROPS; CARICA PAPAYA; PLANTING; DOMESTIC GARDENS; HARVESTING

Family farm is also a tree sanctuary and a home for rescued Taal [Batangas, Philippines] horses. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 29-33. 2020.*

FARMS; RURAL AREAS; TOURISM; CROPS; FRUIT TREES; ORYZA SATIVA; PLANTING; HARVESTING; INDIGENOUS KNOWLEDGE

Family works hand-in-hand to manage a mango and vegetable farm in Batangas [Philipines]. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 6-8. 2021.* https://agriculture.com.ph/2020/09/06/family-farm-is-also-a-tree-sanctuary-and-a-home-for-rescued-taal-horses/

MANGIFERA INDICA; MANGOES; VEGETABLE CROPS; PLANT ESTABLISHMENT; CROP MANAGEMENT; CROPS; PHILIPPINES

Farm stands strong after Taal Volcano [Batangas, Philippines] eruption and now, amid the health crisis. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p. 42-50. 2021.* https://agriculture.com.ph/2020/08/11/a-farm-stands-strong-after-the-taal-volcano-eruption-and-now-amid-a-health-crisis/

VEGETABLE CROPS; FARMS; CROPS; CROP MANAGEMENT; RURAL AREAS; TOURISM

Farmer cafe owner's pandemic endeavor links Benguet Farmers to Manila [Philippines] customers. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 31-33. 2021.* https://agriculture.com.ph/2021/02/14/former-cafe-owners-pandemic-endeavor-links-benguet-farmers-to-manila-customers-encourages-farmers-kids-to-stay-in-agriculture/

VEGETABLE CROPS; FARMS; AGRICULTURAL PRODUCTS; FARMERS; CONSUMERS; PHILIPPINES

Five tips on how to start a farm even without prior experience. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 9. 2021.*
https://agriculture.com.ph/2020/10/02/five-tips-on-how-to-start-a-farm-even-without-prior-experience/

FARMS; CROPS; FARMING SYSTEMS; CROP MANAGEMENT; PLANT ESTABLISHMENT

Former OFW [Overseas Filipino workers] runs integrated natural farm in Oriental Mindoro [Philippines] donates farm products amid pandemic. **Mendenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 30-32. 2021.*
https://agriculture.com.ph/2020/12/15/former-ofw-runs-integrated-natural-farm-in-oriental-mindoro-donates-farm-products-amid-pandemic/

FARMS; COCOS NUCIFERA; FRUIT TREES; ORNAMENTAL PLANTS; CROP MANAGEMENT; ORGANIC AGRICULTURE; PHILIPPINES

Former teacher creates a 'Bougie Wonderland' in Isabela [Philippines]. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 40-42. 2021.*
https://agriculture.com.ph/2021/03/19/former-teacher-creates-a-bougie-wonderland-in-isabela-to-keep-her-busy-and-to-turn-a-profit/

BOUGAINVILLEA; ORNAMENTAL PLANTS; PLANTING; CROP MANAGEMENT; LANDSCAPING; FLOWERING; PHILIPPINES

Fruit thinning enhances yield and quality of local apple fruit (Malus domestica Borkha usen) var. Gaja in Pakistan. **Rehman, N. noorhorticulture@gmail.com., Latif, A. Gomal Univ., Khyber Pakhtunkhwa (Pakistan). Dept. of Horticulture. Hashim, M.M. Gomal Univ., Khyber Pakhtunkhwa (Pakistan). Dept. of Food Science and Technology. Khan, A.A., Gillani, S.G., Khan, H.U. Gomal Univ., Khyber Pakhtunkhwa (Pakistan). Dept. of Horticulture. Ali, M. Gomal Univ., Khyber Pakhtunkhwa (Pakistan). Dept. of Agronomy.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 66-72. 2020.*

The apple tree usually has heavy fruit set but to improve the individual fruit size, apple growers reduce the number of fruits by thinning. The present study was carried out to assess yield and quality of apple fruit as influenced by fruit thinning. The experiment was carried out in a randomized complete block design (RCBD), with two factors, viz. time of thinning (factor 1) and amount of thinning (factor 2). Factor 1 included thinning after 2 wk of fruit set; Factor 2 included one fruit per cluster, two fruits per cluster, three fruits per cluster, and four fruits per cluster. Each treatment was replicated three times. The

indigenous apple germplasm Gaja was selected for the experiment. Fruit diameter, fruit length, fruit weight, fruit color, total soluble solids (TSS), and fruit pH were significantly improved by fruit thinning intensity while total yield, fruit drop percent, number of fruits per kg and fruit firmness were reduced by increasing thinning intensity. Leaving 2-3 fruits per cluster not only improved the fruit size (diameter and length) but also gave maximum economic return.

MALUS PUMILA; APPLES; FRUITS; YIELDS; DEFRUITING; CHEMICAL PRUNING; CULTIVATION; PLANT PRODUCTION; FOODS; QUALITY; PAKISTAN

Garden of Hope: community garden is a source of food, profit and hope for community members displaced by the Zamboanga [Philippines] siege. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p.19-21. 2021.*
https://agriculture.com.ph/2021/02/21/a-garden-of-hope-community-garden-is-a-source-of-food-profit-and-hope-for-community-members-displaced-by-the-zamboanga-siege/

VEGETABLE CROPS; DOMESTIC GARDENS; GARDENING; HYDROPONICS; SOCIAL PARTICIPATION; WOMEN; COMMUNITY INVOLVEMENT; PHILIPPINES

Grade three teacher is also a weekend farmer who earns from growing pineapple. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 40-44. 2020.*
https://agriculture.com.ph/2020/08/20/this-grade-three-teacher-is-also-a-weekend-farmer-who-earns-from-growing-pineapples-part-1/

ANANAS COMOSUS; PINEAPPLES; VARIETIES; PLANTING; CROP MANAGEMENT; MARKETING; VEGETABLE CROPS; FRUIT TREES; FARMING SYSTEMS

Growing coffee brought a local back home to Leyte [Philippines] where she flourished in the trade. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 10-17. 2021.*
https://agriculture.com.ph/2020/11/18/growing-coffee-brought-a-local-back-home-to-leyte-where-she-flourished-in-the-trade-part-1-starting-out/

COCOS NUCIFERA; MUSA (BANANAS); COFFEA; PLANTING; INTERCROPPING; PROCESSING; PROCESSED PLANT PRODUCTS; PHILIPPINES

Growing concern over ornamental theft is alarming, here's how you can save your plants from thieves. **Mendenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 60-61. 2021.*
https://agriculture.com.ph/2020/11/17/the-growing-concern-over-ornamental-theft-is-alarming-heres-how-you-can-save-your-plants-from-thieves/

ORNAMENTAL PLANTS; DOMESTIC GARDENS; GARDENING; DEMAND; THEFT

Heterogeneous climatic impacts on agricultural production: evidence from rice yield in Assam, India. **Nath, H.K. Sam Houston State Univ., 1905 University Ave, Huntsville, TX 77340, (USA). eco_hkn@shsu.edu., Mandal, R. Assam Univ,, Silchar (India). rajum06@gmail.com.** *Asia Life Sciences (Philippines). 0117-3375. v. 15 (1) p. 23-42. 2018.* https://ajad.searca.org/article?p=654

Understanding the nature and extent of climatic impacts on agricultural productivity under a variety of scenarios is extremely important for developing countries, where a sizable portion of the population relies on agriculture for life and livelihood. Thus, this paper presents evidence of heterogeneity in climatic impacts on crop yield in Assam, India. In particular, applying the non-parametric quantile regression technique to district-level data from 1978 to 2005, this study examined heterogeneity in the impacts of temperature and rainfall across seasonal rice varieties (autumn, winter, and summer), agroclimatic (AC) zones, and the distribution of rice yield. The results suggested that, in general, the effects of temperature on yield were not statistically significant for any of the three seasonal rice varieties. However, these effects were not uniform in their magnitudes, signs, and statistical significance across AC zones and yield distribution for each variety of rice. Similarly, there were wide variations in the effects of total precipitation across seasonal varieties, AC zones, and yield distribution. The results also suggested that an increase in temperature variability is beneficial and that rainfall variability is harmful to autumn and winter rice yield. For summer rice, the effects of these two climate variables were positive but statistically insignificant. Given the importance of rice yield for food security and poverty alleviation in Assam, these results could inform the design of appropriate adaptation strategies and public policies to counter the adverse impacts of climate change on agriculture in Assam. Furthermore, since most people in rural areas are engaged in agriculture, these results are important for the sustainability of rural economies.

ORYZA SATIVA; PLANT PRODUCTION; CROP YIELD; CLIMATIC CHANGE; RAIN; TEMPERATURE; INDIA

Hobbyist turns her home into a flower garden and earns from it during the pandemic. **Mendenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 43-45. 2021.* https://agriculture.com.ph/2020/08/04/hobbyist-turned-her-home-into-a-flower-garden-and-earns-from-it-despite-covid-19-situation/

BOUGAINVILLEA; ORNAMENTAL PLANTS; GARDENS; CROP MANAGEMENT; PLANT PROPAGATION

In the era of climate change: moving beyond conventional agriculture in Thailand. **Lee, S. Seoul National Univ. (South Korea). Asia Development Inst. lee.suyeon@snu.ac.kr.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 18 (1) p. 1-14. 2021.*
https://ajad.searca.org/article?p=1502

Thailand is ranked among the top 10 countries most vulnerable to climate change, and its farmers have faced the risk of natural disasters almost every year for nearly 30 years. However, those affected by climate change have also been the largest contributors to climate change, increasing the risks they will face in the near future. The intensive use of chemical pesticides in conventional agriculture has harmed not only the environment and biodiversity but the health of both users and consumers. Responding to these problems, several policies have been put in place over the past decades to reduce pesticide usage as well as to encourage farmers to switch to low-carbon and low-pesticide agriculture, namely, organic agriculture. This study reviews policies related to the development of organic agriculture in Thailand and examines whether organic agriculture is an effective adaptation and mitigation strategy to climate change that can also generate enough food. This study finds that the organic sector has been largely driven by the private sector, particularly the agricultural cooperatives and non-governmental organizations (NGOs), which have provided various support ranging from technology transfer, production, financing, distribution, to marketing of organic products. Their role is vital in encouraging farmers to switch to organic farming and growing market opportunities for organic goods. Nevertheless, constraints including inconsistent policies and limited support from the government remain, which, to some extent, weakens the efforts to build sustainable agriculture and climate resilience. To improve organic farming, there is a need for the government agencies to work together with all relevant stakeholders in the organic sector, namely agricultural cooperatives, NGOs, and consumers.

ORGANIC AGRICULTURE; CLIMATIC CHANGE; ADAPTATION; SUSTAINABILITY; COOPERATIVES; THAILAND

Increasing crop production benefits to small producers in Bangladesh. **Bryan, E. e.bryan@cgiar.org., Ringler, C. International Food Policy Research Inst., Washington, D.C. (USA). c.ringler@cgiar.org., Bell, A.R. New York Univ., New York, NY 10012 (USA). ab6176@nyu.edu., Ahmed, A.U. International Food Policy Research Inst., Washington, D.C. (USA). a.ahmed@cgiar.org.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 15 (1) p. 1-22. 2018.*
https://ajad.searca.org/article?p=610

Agricultural production in South Asia is characterized by intensive use of inputs, such as fertilizers and irrigation water, and by a focus on production of staple crops, especially rice. However, continued growth of the agriculture sector is hampered by a number of challenges. In Bangladesh, these challenges include declining productivity of inputs, resource degradation, and lack of crop diversification. Expansion of agricultural lands is not an option given high population density. Rather, greater efficiency in agricultural production is needed to increase benefits to small producers. This paper examined the benefits of key crop production decisions for rural livelihoods across Bangladesh in order to suggest ways in which producers can increase returns to crop production. The study used plot-level data from a household survey to estimate the relative contribution of various inputs and practices to the total value of production from a given plot over the course of one year. Results were run separately for upper and lower expenditure quintiles to compare production outcomes for richer and poorer households. Three key results emerged: (1) that urea subsidies yielded benefits, though these might not be reaching those that needed it most; (2) that access to groundwater resulted in better production outcomes than access to surface water; and (3) that returns were greater from plots where rice was rotated with other crops.

CROPS; PLANT PRODUCTION; FERTILIZERS; IRRIGATION; FARM INPUTS; ECONOMIC ANALYSIS; BANGLADESH

Integrating plant growth promoting rhizobacteria to hydroponics production system of loose leaf lettuce (Lactuca sativa L.). **Garrigues, R.B. Upi Agricultural School, Upi, Maguindanao (Philippines). Coll. of Agriculture. Garrigues, M.M. Surigao del Sur State. Univ., San Miguel, Surigao del Sur (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 2-5 Jul 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 33. 2019.*

One of the constraints in adopting soil less lettuce production is the high production cost. Simple Nutrient Addition Program (SNAP) is an inorganic hydroponics solution that is easy to use even by inexperience home gardeners. To complement the technology with organic components and to find lower cost of producing quality lettuce, plant growth promoting rhizobacteria (PGPR) were tested in SNAP-based static hydroponics lettuce production. The study was laid out in RCBD with 3 replications testing the following treatments under semi-controlled greenhouse environment in Upi, Maguindanao (453m ASL): (1) TagWater (TW), (2) Recommended Rate (RR) SNAP, (3) RR SNAP+ Azospirillium pp, (4) RR SNAP-VAM, (5) RR SNAP+VAM+Azotobacter sp., (10) TW+Azospirillium spp., (11) TW+VAM and TW+VAM+Azotobacter sp. Plant height number of leaves and total leaf area of lettuce grown with RR SNAP+Azospirillium spp., 1/2 RR SNAP+Azospirillium spp., RR

SNAP+VAM+Azotobacter sp., and 1/2 RR SNAP+VAM+Azotobacter sp. recorded positively significant results and comparable toplants with recommended rate of SNAP. Lettuce grown in VRR SNAP+VAM+ Azotobacter sp., and 1/2 RR SNAP+Azospirillium sp. yielded the highest marketable products. Lettuce grown in TW+Azospririllium spp. had the highest ROI due to the low computed production cost. On conservative projection, lettuce grown in 1/2 RR SNAP+Azospirillium spp. and 1/2 RR SNAP+VAM+Azotobacter sp. came out to have the top net income.

LACTUCA SATIVA; LETTUCES; RHIZOBACTERIA; HYDROPONICS; INTEGRATED PLANT PRODUCTION

Kids are alright: farm youth program trainee returns from Japan exchange hopes to start own citrus farm. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 34-36. 2021.* https://agriculture.com.ph/2021/01/10/the-kids-are-alright-farm-youth-program-trainee-returns-from-japan-exchange-hopes-to-start-own-citrus-farm/

CALAMONDINS; CITRUS GRANDIS; CITRUS MITIS; FARMS; MANDARINS; FARMING SYSTEMS; FARMERS

Local food for local good: youth action for food security amidst the COVID-19 pandemic. **Pasiona, S.P., Estareja, Z.M.C., Felix, N.P.** *SEARCA Agriculture and Development Notes (Philippines). 2225-9694; 2599-3860. v. 10 (1) p. 1-8. 2021.* https://www.searca.org/pubs/briefs-notes?pid=508

DOMESTIC GARDENS; GARDENING; YOUTH; FARMING SYSTEMS; FOODS; FOOD SECURITY

Make room in the fridge for Eclipse watermelon that offers a slice of freshness and summer! **Anon.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) 14-15. 2021.*

CITRULLUS LANATUS; WATERMELONS; VARIETIES; PLANTING; ORGANOLEPTIC PROPERTIES; KEEPING QUALITY

Making money from ornamentals and water plants. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 49-51. 2021.* https://agriculture.com.ph/2020/07/20/making-money-from-ornamentals-and-water-plants/

AQUATIC ORNAMENTAL PLANTS; VARIETIES; PLANTING; PLANTS; CUTTINGS; NUTRIENT SOLUTIONS

Manobo-owned coconut farm recovered from deforestation and is now a thriving farm business. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25(4) p. 49-51. 2021.* https://agriculture.com.ph/2020/10/17/in-three-years-a-manobo-owned-coconut-farm-has-recovered-from-deforestation-and-is-now-a-thriving-farm-business/

COCOS NUCIFERA; COCONUTS; VEGETABLE CROPS; FRUIT TREES; PLANTING; POULTRY; LIVESTOCK; FARMS; ORGANIC AGRICULTURE

Millennial finds purpose and success in farming after dropping out in university. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 48-50. 2020.* https://mb.com.ph/2020/08/15/a-millennial-found-his-purpose-and-success-in-farming-after-dropping-out-of-university/

FRUIT TREES; MUSA (BANANAS); FARMING SYSTEMS; PLANTING; CROP MANAGEMENT; CROP YIELD; HARVESTING; STEMS

Millennial turns backyard garden into small farm. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p. 51-53. 2021.* https://agriculture.com.ph/2020/08/19/milays-garden-a-millennials-backyard-garden-turned-small-farm/

VEGETABLE CROPS; FRUIT TREES; GARDENING; DOMESTIC GARDENS; CROP MANAGEMENT; CROPS

'Moss' useful ball can grow plants and beautify the environment, the. **Hubilla, E.K.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 63. 2021.* https://agriculture.com.ph/2020/05/21/the-moss-useful-ball-can-grow-plants-and-beautify-the-environment/

ORNAMENTAL PLANTS; PLANTING; PLANT TRAINING; SOIL; BRYOPHYTA; ROOTS

Moving to Bulacan [Philippines] turned to manager's gardening dream into a reality. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 46-47. 2020.* https://agriculture.com.ph/2020/07/31/moving-to-bulacan-turned-a-managers-gardening-dream-into-a-reality/

VEGETABLE CROPS; CULINARY HERBS; PLANTING; FRUIT TREES; CROP MANAGEMENT; CROPS; GARDENING; PHILIPPINES

OFW [Overseas Filipino Worker] established a greenhouse in Sweden to sustain her through long winters. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p. 43-44. 2021.* https://agriculture.com.ph/2020/06/12/an-ofw-established-a-greenhouse-in-sweden-to-sustain-her-through-long-winters/

VEGETABLE CROPS; GARDENING; GREENHOUSES; FARMS; CHICKENS; DUCKS; TURKEYS; COMPOSTS; FARMING SYSTEMS

Orchard in Western Mindanao [Philippines] grows figs and other exotic fruit-bearing trees. **Taculao, P.B.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 34-35. 2020.* https://agriculture.com.ph/2020/07/22/an-orchard-in-western-mindanao-grows-figs-and-other-exotic-fruit-bearing-trees/

FIGS; MULBERRIES; VARIETIES; CULINARY HERBS; FRUIT TREES; PLANTING; PLANT NURSERIES; ORCHARDS; CROP MANAGEMENT

Orchid farm in Bulacan [Philippines] makes the luxury plant available for all. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 24-27. 2021.* https://agriculture.com.ph/2020/07/24/an-orchid-farm-in-bulacan-makes-the-luxury-plant-available-for-all-part-1/

ORCHIDACEAE; ORNAMENTAL PLANTS; FARMS; FARM MANAGEMENT; COSTS; CROP MANAGEMENT; PLANT ESTABLISHMENT; PHILIPPINES

Part-time bougainvillea grower earns a minimum of P[hp]20,000 a month from selling cuttings. **Mendenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 46-48. 2021.* https://agriculture.com.ph/2020/12/17/part-time-bougainvillea-grower-earns-a-minimum-of-20k-a-month-from-selling-cuttings/

BOUGAINVILLEA; VARIETIES; DOMESTIC GARDENS; GARDENING; CROP MANAGEMENT; CUTTINGS

Performance and productivity of ampalaya (Momordica charantia L.) under protected cultivation in response to different pruning techniques. **Batuigas, A.M.T. University of Science and Technology of Southern Phili ppines-Claveria Moscat Compound, Claveria 9004, Misamis Occidental (Philippines). Gonzaga, Z.C., Salas, R.A. Visayas State Univ., Visca, Baybay, Leyte, 6521 -A (Philippines). Dept. of Horticulture.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019.

Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 30-31. 2019.

Bitter gourd (Momordica charantia L.) is one of the top 10 most consumed vegetable in the Philippines due to its nutritional and medicinal values. Its production therefore must be increased through appropriate cultural management practices and one such is pruning. This study was conducted at Visayas State University [Philippines] experimental station from January to May 2018. In order to evaluate the performance and productivity qualities of ampalaya as influenced by different pruning techniques. The experiment was laid out in a simple Randomized CompleteBlock Design with three replications and four treatments namely: 10-No pruning, T1-Pruning the main stem at the3rd node, T2-Pruning the main stem at the 7th node and T3-laterals within the first 0.5m of the main vine pruned. Results revealed that removal of lateral vines within the first 0.5m of the main vine significantly enhanced the attainment of reproductive stage expressed in terms of the number of days to first staminate and pistilate flower appearance and node number bearing the first flower. This pruning technique also favored the vegetative characteristics of ampalaya such as main vine length, fresh weight of vines and herbage yield. Greatest number and heaviest weight of marketable fruits and consequently total fruit yield of 61.29 t/ha was obtained in this method of pruning. Therefore, removal of all lateral vines 0.5m from the base of the plant was the h pruning technique for ampalaya.

MOMORDICA CHARANTIA; CROP PERFORMANCE; PRUNING; PLANT PRODUCTION; CULTURAL METHODS

Permaculturist shares space-saving tips for a small garden. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 58; 60. 2020.*

VEGETABLE CROPS; DOMESTIC GARDENS; GARDENING; PLANTING; COMPOSTS; ORGANIC FERTILIZERS; PLANTING EQUIPMENT

Policy imperatives to promote urban agriculture in response to COVID-19 pandemic among local government units in the Philippines. Ancog, R.C. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Gregorio, G.B. Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). **Arcillas, A.B. Office of the Congressman of the First District (Philippines). Philippine House of Representatives. Creensia, E.C. City of Environment and Natural Resources Offic, City Government of Sta. Rosa, Laguna (Philippines). Aguitania, V.E. ICLEI Local Government for Sustainability (Southeast Asia). Panganiban, G.G.F. Department of Agriculture-Bureau of Plant Industry (Philippines). Hidalgo, G.A. Rotary**

Club of Bay-District 3820 (Philippines). *SEARCA Policy Paper (Philippines). v. 2020 (3) p. 1-8. 2020.*
https://www.searca.org/pubs/briefs-notes?pid=473

URBAN AGRICULTURE; FARMING SYSTEMS; LAND USE; CLIMATIC CHANGE; PRODUCTION; LOCAL GOVERNMENT; PHILIPPINES

Professor turns his dark garage into a vibrant greenhouse. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 55-57. 2021.*
https://agriculture.com.ph/2020/07/07/professor-turns-his-dark-garage-into-a-vibrant-greenhouse/

ORNAMENTAL PLANTS; DOMESTIC GARDENS; GARDENING; CROP MANAGEMENT; GREENHOUSES

Property clean up project of a couple progressed into a prolific urban garden. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p.52-55. 2021.*
https://agriculture.com.ph/2020/11/07/property-clean-up-project-of-a-couple-progressed-into-a-prolific-urban-garden-part-1/

ORGANIC AGRICULTURE; FRUIT TREES; VEGETABLE CROPS; DRUG PLANTS; FRUIT; URBAN AREAS; GARDENS

Readers' condo roof deck garden grows melons and vegetables. **Taculao, P.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 62. 2021.*
https://agriculture.com.ph/2020/08/30/a-readers-condo-roof-deck-garden-grows-melons-and-vegetables/

VEGETABLES; VEGETABLE CROPS; FRUITS; URBAN AGRICULTURE; GARDENING; CONTAINER PLANTING

Rice grown by drone demonstration. **Barroga, R.F. Philippine Rice Research Inst., Mali gaya, Science City of Muñoz, Nueva Ecija (Philippines). Tan, A. New Hope Corporation, Ma-a Davao City (Philippines). Caballong, N.L., Alday, P.A.A., Dicon , E.M. III. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 164. 2019.*

Rice production in the Philippines has improved significantly since the 1950s. The use of better quality seeds, new farming methods and information, mechanization, and modernization has positively affected rice crop yield and has reduced cost of production. Rice agriculture continue to improve, employing more advanced technologies such as drones. A model of drone technology is composed of a remotely-controlled intelligent hexa-copter aircraft and detachable sprayer and spreader components with the load capacity of 10li and 10kg, respectively. The system has automated mission feature wherein users can plot out the area to hover and it automatically creates and follows a flight path. The drone is also capable of resuming its mission path after refilling should it emptied its tank load at midflight. To pilot-use and simulate a rice production wherein an agricultural drones are fully integrated in the crop established, fertilizer application, and weeds management processes, a 1,391 sqm demonstration plot was established in dry season 2019 at PhilRice CES, Nueva Ecija. In the crop establishment phase, a precision drone spreader was used to broadcast pre-germinated NSIC Rc 402 at 20kg/ha seeding rate. Farmers usually use 40-80kg/ha of seeds. After two days, it was followed by the application of pre-emergence herbicide using 160l/ha water dilution ratio. For the fertilizer application, the precision drone spreader was again used. The recommended 120-60-60/ha nutrient rate at the area was employed in this phase in two-split distribution. By the end of the season, the actual yield data was recorded. Results showed that the variety used reached its 5.0t/ha average yield for direct seeding. This suggests that it is possible to produce rice with the use of agricultural drones.

ORYZA SATIVA; VARIETIES; PLANT ESTABLISHMENT; INNOVATION ADOPTION; AUTOMATION; EQUIPMENT; COMPUTER APPLICATIONS

Rooftop gardening using an aquaponics system. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p. 40-41. 2021.*
https://agriculture.com.ph/2020/04/16/rooftop-gardening-using-an-aquaponics-system/

VEGETABLE CROPS; FISHES; HYDROPONICS; URBAN AGRICULTURE; GARDENING

Senior citizen's Quezon [Philippines] product of hard work. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 27-28. 2021.*
https://agriculture.com.ph/2020/10/03/senior-citizens-quezon-farm-is-the-product-of-hard-work/

ORYZA SATIVA; VEGETABLE CROPS; FRUIT TREES; LIVESTOCK; FARMS; ORGANIC AGRICULTURE

Surigao del Sur [Philippines] housewife beauties her home in the wetlands. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 26-27. 2021.* https://agriculture.com.ph/2020/08/17/a-housewife-from-surigao-del-sur-beautifies-her-home-in-the-wetlands/

ORNAMENTAL PLANTS; VEGETABLE CROPS; DOMESTIC GARDENS; GARDENING; WETLANDS; WOMEN; PHILIPPINES

Sustainable planting calendar to address climate change. **Seville, C.U. cu.seville@philrice.gov.ph., Parina, C.J.E. Philippine Rice Research Inst., Cansilayan, Murcia, Negros Occidental (Philippines). cj.parina@philrice.gov.ph.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44(Supplement no. 1) p. 178. 2020.*

Climate change is one of the challenges that can affect all aspects of food security including access, utilization and price stability. It also affects the incidence and emergence of pests and disease, thereby affecting food production. Researchers made an effort toward the development of mitigation and adaption technologies for rice in order to cope with the changing climate. It includes the development of planting material, establishment methods and production technologies that are suitable to the existing environments. One of the PhilRice Negros' efforts on addressing the issue is to identify the suitable planting dates for rice establishment. Six rice varieties that include NSIC 302, 354, 360, 398, 400 and 440 were established in a randomized complete block design with 9m2 plot size. A 1-week sowing interval was done during the dry season of 2019 from first week of November 2018 to midweek of January 2019. Results showed that, sowing of these entries on the last week of November yielded high among other schedules while the lowest was during the mid of December. NSIC Rc354 and NSIC Rc360 were the highest and lowest yielder during the last week November with 6.4t/ha and 3.4t/ha, respectively. The yield pattern was becoming lower as the schedules became late as affected by the availability of water.

ORYZA SATIVA; VARIETIES; PLANTING DATE; CROP MANAGEMENT; CLIMATIC CHANGE; TECHNOLOGY; TECHNOLOGY TRANSFER; ADAPTATION

Taking the road less traveled prompted a couple to buy a lot and start their own Filipino dream of farming. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 25-26. 2021.* https://agriculture.com.ph/2020/11/09/taking-the-road-less-travelled-prompted-a-couple-to-buy-a-lot-nearby-and-start-their-own-filipino-dream-of-farming/

FRUIT TREES; VEGETABLE CROPS; FARMING SYSTEMS; RURAL AREAS; TOURISM; PHILIPPINES

Tips in running a successful nursery. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 58-59. 2021.*
https://agriculture.com.ph/2020/06/17/tips-on-running-a-successful-nursery/

FRUIT TREES; FOREST TREES; ORNAMENTAL WOODY PLANTS; PLANT NURSERIES; PLANT PROPAGATION; CROP MANAGEMENT

Tips on starting your own hydroponic farm. **Taculao, P.B.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 39. 2021*
https://agriculture.com.ph/2020/09/14/tips-on-how-to-start-your-own-hydroponic-farm/

FARMS; CROPS; PLANTING; HYDROPONICS; GROWING MEDIA

Urban micro garden: start your garden even without direct sun. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (1) p. 45-46. 2021.*
https://agriculture.com.ph/2020/04/23/urban-micro-garden-heres-how-you-can-start-your-garden-even-without-direct-sun/

VEGETABLE CROPS; CULINARY HERBS; ORNAMENTAL PLANTS; GARDENING; URBAN AGRICULTURE; PLANTING; CROP MANAGEMENT

Use of multi-purpose seeder: an innovation to improve farm sustainability in rainfed lowlands. **Corales, A.M. am.corales@philrice.gov.ph., Santos, R.C., Abon, J.E.O., Bautista, E.G., Dingle, E.L., Suralta, R.R., Basuel, E., Peralta, L.C., Martin, E.C. Philippine Rice Research Inst. Central Experiment Station, Maligaya, Muñoz, Nueva Ecija (Philippines). Bueno, C.S., Banayo, N.C. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Marine Genomics and Molecular Genetics Lab. Kato, Y. University of Tokyo, Nishitokyo (Japan).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 179. 2019.*

Rice farmers in rainfed environments are faced with unpredictable rainfall patterns and high production cost. Dry direct-seeded rice (DDSR) is a potential crop establishment alternative to transplanted rice to cope with water shortage and increasing cost of production. Dry direct seeding using a mechanical row seeder in contrast to manual seeding

enables rice seeds to be planted at proper soil depth and with even distribution resulting in uniform and stable crop stand. However, most of the currently used types of mechanical seeders for rice have their own strong and weak points. A seeder to mechanize seeding of rice and which could also be utilized for seeding cash crops would be of great help in reducing the cost of production especially of farmers in rainfed lowlands. On-farm verification trails conducted in Regions 1, 2, 3, 6 and 12 revealed that in using a multi-purpose seeder for DDSR, the seeds and labor costs in wet season 2017 and 2018 were significantly reduced by 55% and 56% respectively. Total production cost was 8% or Php 7,212.00 lower when using the multi-purpose seeder compared to farmer's practice this contributing to an additional income of Php 11,316/ha. Results suggest that the use of a multi-purpose seeder could contribute in improving the livelihood of farmers thereby improving farm sustainability in areas prone to drought.

ORYZA SATIVA; RICE; DIRECT SOWING; EQUIPMENT; PLANT ESTABLISHMENT; RAINFED FARMING; LOWLAND

Zambales [Philippines] farm has a competitive edge in the market through hydroponics. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 35-38. 2021.* https://agriculture.com.ph/2020/09/04/a-farm-in-zambales-has-a-competitive-edge-in-the-market-through-hydroponics/

VEGETABLE CROPS; FARMS; HYDROPONICS; GREENHOUSES; FARMERS; INCOME; PHILIPPINES

Zamboanga City [Philippines] fashion designer grows over 200 plants in her small garden. **Taculao, P.B.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 16-18. 2021.* https://agriculture.com.ph/2020/12/04/fashion-designer-from-zamboanga-city-grows-over-200-plants-in-her-small-garden-and-shares-her-secret-on-how-she-maintains-it/

ORNAMENTAL PLANTS; PLANTING; DOMESTIC GARDENS; GARDENING; PHILIPPINES

F02 - PLANT PROPAGATION

Development of a cell suspension protocol for abaca (Musa textilis Nee 'Inosa'). **Aspuria, E.T., Bernardo, E.L. elbernardo@up.edu.ph., Tayangona, M.A.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 179-190. 2020.*

A protocol for the establishment of embryogenic cell suspension in abaca was developed based on the International Network for the Improvement of Banana and Plantain (INIBAP)

procedure for Musa. Meristematic buds from shoot cultures were exercised and cultured on P5 medium for several cycles until 'scalps' formed. These scalps were then used to produced embryogenic complexes (ECs) in 2,4-D containing media. Discrete primary somatic embryos (SEs) were observed on ECs 3-4 wk after initial culture. After 6 mo, 6% of the 150 inoculated scalps formed into ECs that had at least 10 SEs. These were then used to commence cell suspensions. Nine liquid media formulations were tested, and only M2 medium produced cell lines that had a characteristics bright yellow suspension indicative of embryogenic potential. However, doubling time during the initiation phase with M2 medium was lower than the doubling time in the rest of the media tested. In several months, cell lines in M2 medium stabilized wiyh an average doubling time of about 4 wk. The old medium was replenished with fresh medium every 4-7 d, replacing at least 80% of the old medium. Maintenance of fine homogenous suspension was done at monthly intervals by transferring 2 mL aliquots with a settled cell volume (SCV) of 0.2-0.3 mL from a 1-mo-old suspension culture to an 8 mL fresh medium in 125-mL Erlenmeyer flasks. As for embryo development, regeneration media trials showed that Murashige and Skoog (MS) and M2 media promoted the formation of yellow, nodular calli, or pro-embryogenic masses (PEMs). MS and M2 medium supplemented with 1 ppm AgNO3 (with or without ascorbic acid) could enhance PEM formation, especially if the cells were pre-induced to form PEMs by gradual reduction of 2,4-D while at the cell suspension stage. Sucrose or glutamine does not seem to have any promotive effect on PEM induction during the regeneration phase. These treatments, however, were not favorable for the conversion of PEMs into mature somatic embryos. Likewise, M3 regeneration media promoted PEM formation but failed to induce somatic embryogenesis in a separate experiment. PEMs derived from the 2,4-D reduction experiment were proliferated in M2 medium and transferred in P5 for embryo development. PEMs bearing mature somatic embryos in P5 medium were transferred to abaca shoot proliferation medium where fully developed shoots were obtained in 6 mo. Although the protocol requires validation, our results clearly demonstrate that abaca could undergo in vitro somatic embryogenesis (SE) and offer a transformation platform for modern genetic improvement work.

MUSA TEXTILIS; ABACA; EMBRYONIC DEVELOPMENT; SOMATIC EMBRYOS; PLANT EMBRYOS; IN VITRO CULTURE; CULTURE TECHNIQUES; REGENERATION; MERISTEMS; PLANT TISSUES; CULTURE MEDIA

Development of protocol for somatic embryogenesis and regeneration of Arabica coffee (Coffea arabica L.). **Tad-awan, B.A. Benguet State Univ., La Trinidad, Benguet (Philippines). Dept. of Crop Science. Dumastan, M.R., Manuel, S.B. Benguet State Univ., La Trinidad, Benguet (Philippines). Higher Education Regional Research Center.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019.

Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 24. 2019.

Arabica coffee is a very important crop in the Cordillera region and one of the promising industrial crops in the highlands. To develop a tissue culture protocol for 'Typica', 'Mundo Novo' and 'Red Bourbon' cultivars, growth hormone combinations of Benzyl Amino Purine (BAP). Kinetin, (Kin), Indole Acetic Acid, (IAA), 2.4-Dichlorophenoxyacetic acid (2,4-D) at varying concentrations (1, 2, 3, 4, 6 ppm/L) and light conditions (16 hours light, 24 hours light, dark condition) were tested on somatic embryos, leaf discs and shoot tips grown in MS medium. It was conducted in March 2018 at the BSU Tissue Culture Laboratory using Complete Randomized Design in five replicates. Using somatic embryo, 'Mundo Novo' inoculated in 2ppm BAP + 2ppm Kinetin at 16 hours light emerged shoot 18.2 days after inoculation (DAI), and produced 4 shoots at 91.75 DAL in 2ppm BAP + 2ppm Kin + 1ppm IAA at 24 hours light. 'Typica' inoculated in 2ppm BAP + 2ppm Kin + 2ppm IAA at 24 hours light induced shooting after 19 days and proliferated 5.43 shoots after 87.4 days in 2ppm BAP + 2ppm Kin + 2ppm IAA at 16 hours light condition.'Red Bourbon' initiated shoot emergence 35 DAI in 1ppm GA + 8ppm BA + .5ppm IAA in dark condition. Using leaf disc, 'Red Bourbon' recorded earliest callus initiation at 14.53 DAI in 1ppm GA3 + 8ppm BAP + .5ppm IAA in dark condition. 'Mundo Novo' formed callus 15 DAI in 6ppm BAP+ 6ppm Kinetin + 3ppm IAA in the dark. 'Typica' formed callus 23 DAI in 4ppm BAP + 4ppm Kin + 2ppm 2,4-D at 16 hours light Condition. Among the cultivars and growth media treatments using shoot tip explant, only 'Mundo Novo' produced shoot at 128 DAI in 2ppm BAP + 2ppm kinetin + 1ppm IAA at 16 hours light.

COFFEA ARABICA; SOMATIC EMBRYOGENESIS; LIGHT; GROWING MEDIA; TISSUE CULTURE

Grow ube clones from bulbils. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v.24 (4) p. 64. 2021.*
https://agriculture.com.ph/2021/03/28/grow-ube-clones-from-bulbils/

DIOSCOREA ALATA; YAMS; PROPAGATION MATERIALS; PLANTING DATE; HARVESTING

Growth enhancement and control of culture media browning using activated charcoal in vitro conserved sugarcane (Saccharum officinarum) varieties. **Alcachupas, C.G., Guevarro, P.R., Valle, M.L.S., Huelgas, V.C., Damasco, O. P. Philippines Univ. Los Baños, College, Laguna (Philippines). National Plant G enetic Resources Lab.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 25. 2019.*

In vitro sugarcane conservation plays a vital role in maintaining various genotypes without the risk of natural losses from field genebanks. At present, major constraints in sugarcane in vitro conservation are browning due to excessive phenol exudation, and decline in shoot culture vigor through time. The study aims to determine the effect of activated charcoal (AC), a potent adsorbent of inhibitory substances, on culture media browning and growth of in vitro cultured sugarcane varieties. The study was conducted from August to December 2018 at the National Plant Genetic Resource Laboratory. Institute of Plant Breeding UPLB [University of the Philippines Los Baños]. The experiment was set up using Complete Randomized Design and data were analyzed using One-way ANOVA. Differences in response to varying AC concentration (0, 0.1, 0.25 and 0.5 g/L) in terms of in vitro growth parameters such as number of shoots, shoot length, number of roots, root length, tissue/explant and culture media browning and shoot vigor of the sugarcane varieties were observed 60 days after inoculation. While cultures of PHL 83-120-3401 did not respond to the AC treatments, PHL 54-49 was significantly affected by the different AC treatments in terms of number and length of shoot and roots and culture media browning, with AC concentration of 0.5g/L having lowest shoot proliferation, high root formation and reduced culture media browning. AC-supplementation at 0.25 to 0.5 g/L to the growth media showed significantly higher root formation for both varieties. High concentration of AC also significantly reduced shoot culture media browning. AC supplementation at 0.5 g/L tested across 16 varieties resulted in reduced tissue/explant browning for most of the varieties tested. However, based on frequency distribution of the varieties the highest vigor was observed on medium without activated charcoal. The study shows that the effectivity of AC in improving in vitro culture of sugarcane is greatly influenced by varietal differences.

SACCHARUM OFFICINARUM; SUGARCANE; VARIETIES; IN VITRO REGENERATION; CHARCOAL

In vitro seedling growth of adlay (Coix lacryma-jobi L.) 'pulot' and its response to a 2,4-dichlorophenoxyacetic acid, benzylaminopurine, plain cow dung ash and agnihotra ash. **Bernardo, E.L. elbernardo@up.edu.ph., Fernandez, P.G., Aspuria, E.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Cadiz, N.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Marcelino, R.T. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 245-255. 2020.*

Adlay (Coixlacryma-jobi L.) is an emerging alternative cereal crop which may benefit from plant tissue culture approaches. In this study, the morphogenic response of mature embryos of adlay to 2,4-dichlorophenoxyacetic acid (2,4-D; 1-3 ppm) and benzylaminopurine (BAP; 1-3 ppm) in Murashige and Skoog (MS) basal medium was

screened in vitro. Further, agnihotra ash (AA) and cow dung ash (CDA) were evaluated as unconventional culture media additives. A sterilization procedure was first developed for mature embryos of adlay by varying sodium hypochlorite (NaOCl) concentration and the duration of surface sterilization. NaOCl at 1% (v/v, Chlorox R) using double sterilization (7 min: 8 min) was effective for surface disinfection of dehuskedadlay seeds. In terms of plant growth regulators (PGRs), BAP and 2, 4-D enhanced shoot growth in lower doses, but primary root growth was inhibited. Retarded shoot and root development were observed even at the lowest 2,4-D concentration and as BAP was increased. Yellow, compact callus was observed surrounding the mesocotyl and white crystalline and loose callus around the radicle region. Both types of calli appeared non-embryogenic and were most frequent at 2 and 3 ppm 2,4-D regardless of BAP concentration and ash additives. As for ash additives, application of 0.01 % cow dung ash, 0.01% agnihotra ash and 1% cow dung ash resulted in larger seedlings compared with 1% agnihotra ash in basal media, although these differences were not pronounced in the plant growth regulator (PGR) background. Agnihotra ash and cow dungs ash as miscellaneous additives may provide cost savings in plant tissue culture; further work is warranted.

COIX LACHRYMA JOBI; IN VITRO; MORPHOGENESIS; EMBRYONIC DEVELOPMENT; SEEDLING PRODUCTION; STERILIZATION; SEEDLINGS; PLANT EMBRYOS; TISSUE CULTURE; PLANT GROWTH SUBSTANCES; FARMYARD MANURE; CULTURE MEDIA

Morpho-anatomical investigation on the adventitious rooting of hard-to-root excelsa coffee (Coffea excelsa A. Chev.) stem cuttings. **Opeña, J.M. Cagayan State Univ.-Gonzaga Campus, Cagayan (Philippines). Coll. of Agriculture. jmopena@up.edu.ph., jeffopena122994@gmail.com., Sotto, R.C. Philippines Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Salazar, B.M., Protacio, C.M. University of the Philippines Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (4) p. 303-310. 2020.*

Excelsa coffee (Coffea excelsa A. Chev.) species is known to be hard-to-root when propagated through stem cuttings. This study sought to examine the morpho-anatomical differences between Excelsa and Robusta coffee stem cuttings in order to identify any physical hindrances to rooting and to trace the origin of adventitious rooting in Excelsa coffee. Rooting of single-node orthotropic Excelsa coffee stem cuttings from water sprouts with and without incisions in the rooting zone applied with auxin plus ferulic acid takes 5 mo and 7 mo under mist, respectively. Morpho-anatomical examinations revealed that Excelsa coffee had thicker stem structures compared to Robusta coffee. However, the most probable anatomical difference why Excelsa coffee is harder to root when compared to Robusta coffee is its narrow, compact and clustered nearly continuous layer of

sclerenchyma band as opposed to the discontinuous layer in Robusta coffee. The layer of sclerenchyma physically prevented root initial development which resulted in delayed rooting in Excelsa; this was observed to occur after 4–7 mo compared to Robusta coffee where rooting occurred within 1–2 mo. Restriction of rooting was a result of the physical hindrance on root initial development by the continuous sclerenchyma band rather than by preventing root protrusion or outgrowth. Basal incisions made in the rooting zone physically disrupted the layer of sclerenchyma that enabled the development of root initials which promoted more adventitious roots in the stem cuttings.

COFFEA EXCELSA; ROBUSTA COFFEE; COFFEA; CUTTINGS; ADVENTITIOUS ROOTS; ROOTING; SCLERENCHYMA; PROPAGATION BY CUTTINGS

F03 - SEED PRODUCTION AND PROCESSING

Seeds of selected Philippine soybean genotypes differ significantly in total flavonoids, anthocyanin content, and antioxidant activity. **Esguerra, C.J. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Santos, M.M.L. mlsantos@up.edu .ph. Mateo, J.M.C., Enicola, E.E. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Ocampo, E.T.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 162-163. 2019.*

Aside from desirable agronomic traits, superior nutritional qualities are significant factors in selecting food crop accessions or varieties for breeding. Flavonoids and anthocyanin are secondary metabolites with antioxidant properties known to eliminate or prevent oxidative damage and free-radical formation, contributing significantly to the health of human and animal populations. Conducted in the Analytical Service Laboratory at the Institutes of Plant Breeding, 79 soybean genotypes were characterized: 67 from stable lines of the population IPB SY96-27-23, 11 germplasm accessions from National Plant Genetic Resources Laboratory (NPGRL), three from Institutes of Plant Breeding's Tiwala series, and one identified farmer's variety, Manchuria. This study was conducted from January to May 2019. Three accessions from NPGRL had black seeds, and these were assigned as the control group. Freshly harvested seeds of the 79 genotypes were used for the determinations. Total flavonoid content was measured using NaNO2 and AICI3 method, while the pH differential method was conducted to quantify the total anthocyanin content. Antioxidant activity was assessed using the DPPH assay, and the result expressed as average % Relative Scavenging Activity (% RSA). Analysis of Variance (ANOVA) showed that there were significant differences (at a=0.05) among the genotypes in each of the parameters.

The genotypes were sorted in different group using Tukey's Honestly Significant Difference Post Hoc Test. The total flavonoid content test, which values that ranged from 0.02 g/100g to 0.62 g/100g, resulted in 15 groupings. While total anthocyanin content, with values 0 mg/100 g to 177.01 mg/100 g, had 33 groups. The antioxidant activity test, 11.03% to 29.40%, grouped the genotypes into 26. The data suggest that, over-all, the significant differences among the genotypes with respect to the anthocyanin and flavonoid contents, and total antioxidant activity, can be utilized in breeding for new varieties with high antioxidant content.

GLYCINE MAX; SOYBEANS; SEEDS; GENOTYPES; ANTIOXIDANTS; ANTHOCYANINS; FLAVONOIDS

Seed quality maintenance:sun-drying or mechanical drying? **Brena, S.R. sr.brena@philrice.gov.ph., rcramos@philrice.gov.ph., Ramos, R.C. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines) . Genetic Resources Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 158. 2019.*

Drying rice seeds after harvest plays crucial role in the availability of high quality seeds for planting and storage. In the Philippines, sun-drying is the most common method used by farmers and seed grower though the procedure is whether dependent. Despite the availability of various types of mechanical dryers, farmers do not use this method because some allegedly attribute the low germination rates of rice seeds when dried mechanically. The study aims to determine the effect of drying methods on the quality of stored rice seeds. NSIC Rc160 seeds harvested in dry and wet season 2018 were used in the study. Half of manually harvested seeds were dried in cemented pavement with liner from 7:00 AM to 11:30 AM only and half were dried in flat-bed dryer. Moisture content for both drying methods ranged from 12-13%. Seeds in each dying procedure were cleaned separately using seed cleaner. Seeds were packed in ordinary plastic sack at 25kg per sack then stored in PhilRice seed warehouse under ambient condition. Seed testing for viability and vigor were done after 3, 6, and 9th months of storage. In dry season, results showed that there were no significant differences in seed viability after 9 months, however, lower seed vigor was observed in all treatments after 9 months. Seeds harvested using combine harvester had lower seed vigor noted after 6 months compare to those harvested manually. The results proved that high quality rice seed can be maintained in storage for six months using either solar-drying or mechanical drying.

RICE; SEEDS; QUALITY; NATURAL DRYING; SEED; VIABILITY; SEED CHARACTERISTICS; VIGOUR

Corn cobs: alternative potassium fertilizer source. **Ocampo, A.M., Santos, P.J.A., Salazar, A.M., Descalsota, J.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Plant Breeding. Tumawang, S.M. Department of Agriculture Regional Field Office 2, Ilagan, Isabela (Philippines). Cagayan Valley Research Center. Lapoot, C.R. Department of Agriculture, Malaybalay, Bukidnon (Philippines). Northern Mindanao Agricultural Crop and Livestock Research Center.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 5-6. 2019.*

Corn cobs comprise 20% to 30% of the whole ear weight which are not fully utilized. To determine the potential of corn cobs as alternative potassium fertilizer, greenhouse and field trials were conducted at IPB-NSG [Institute of Plant Breeding- National Seed Foundation at UPLB [University of the Philippines Los Baños], Isabela and Bukidnon [Philippines] during the 2012 dry and wet and 2013 dry season. There is no study that was previously conducted to determine the K content of corn cobs and its effect on corn growth and yield which led to the request by the PhilMaize group thru DA-BAR [Department of Agriculture-Bureau of Agricultural Research] to do this. Results showed that 10-20 tons/ha cobs application for open pollinated variety and 15-20 tons/ha for hybrid corn production, could supply the potassium needed to achieve high yield comparable with that of muriate of potash (K2O). Comparative analysis of ashed, shredded, finely ground, and whole cobs was also done to identify the best source of potassium. Ashed cobs (up to 33.34% K) produced higher fresh biomass yield compared with whole, shredded and finely ground cobs due to the fact that ash contains higher potassium analysis compared with other sources (up to 2.44% K). Extracts from cobs soaked in water could be used as foliar spray 4-5 weeks after soaking in which the solution (at 30%K) that had already established. Pot experiment were conducted, and results showed that the fresh corn biomass was comparable to that of the fully fertilized pot for any cob:water ratio of 1:25 up to 1:500 for both the Lipa clay loam and Alipit clay soil. Results from all trials indicated the potential of corn cob as alternative source of potassium fertilizer. Based on cobs and ash analyses and the field results, applying 2 bags of K2O in the field is equivalent to 5.5 bags ash (104 bags cobs) in Bukidnon, 3.6 bags ash (83 bags cobs) in Isabela, and 4.2 bags ash (49.2 bags cobs) at IPB-NSF. Generated corn cobs based on 2018 corn production could produce ash equivalent to 833 bags of K2O valued at Php 2,165,000 which can be considered as saving by the farmers and the national government.

MAIZE; BYPRODUCTS; FERTILIZER APPLICATION; APPLICATION RATES; POTASH FERTILIZERS

Developing predictive ability of Rice Crop Manager for nitrogen requirement of highly fertile rice soils. **Castillo, R.L., Velasco, M.T., Tafere-Deomano, K.L. International Rice Research Inst., Los, Baños, Laguna (Philippines). Sustainable Impact Platform. Collado, W.B. Philippine Rice Research Inst., Muñoz, Nueva Ecija (Philippines). Torre, J.C.D. International Rice Research Inst., Los, Baños, Laguna (Philippines). Sustainable Impact Platform. Regalado, M.J.C. Philippine Rice Research Inst., Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 31-32. 2019.*

Rice Crop Manager Philippines is a digital tool developed to optimize the rate of N, P and K fertilizers for irrigated and rainfed lowland rice soils. It was based on the principles of site-specific nutrient management that uses yield gain from applied N for calculating N rate to achieve a target yield. Yield in full fertilized plots represents the target yield while yield in N omission plots provides an estimate of the indigenous N supply (INS). INS can vary across diverse fields of different levels of fertility. It is therefore necessary to develop the ability to assign a given field into one of several levels of INS to avoid over application of fertilizer N. There were 190 nutrient omission plot technique (NOPT) trials conducted for two cropping seasons in 2017 to 2018 to determine different levels of INS in diverse rice growing environments in 8 regions in the Philippines. Selected locations were typical rice growing areas (1) in catch basin areas that that may have been receiving nutrients from other fields through run off, (2) along lakes that may have been receiving nutrient-loaded sediments from the lakes during monsoon months or (3) could only plantrice during the dry season and fallow during wet season because of high level of water Levels of INS were in following order: fields along lake with only 1 crop during dry season only (e.g.Siniloan, Laguna) > field salong lake with 2 rice crops per year (e.g. Cannaway, Kitcharao) > fields in lowlying areas as catch basin for adjacent fields (Isabela, Nueva Ecija and Tarlac) > typical rice growing areas (Pangasinan, Occidental Mindoro, Samar, Leyte and fields far from the Mainit Lake in Agusan del Norte). The need for N fertilizer for a target yield was lowest in Siniloan, Laguna and highest in typical rice areas.

SOIL FERTILITY; NITROGEN; NUTRITIONAL REQUIREMENTS; NUTRIENT UPTAKE; FERTILIZER APPLICATION

Efficiency and efficacy of multi-purpose precision drone spreader in nutrient application of rice production. **Collado, W.B., Caballong, N.L. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Crop Protection Div. Tan, A., Barroga, R., Bermudez, R.V. Jr., Cañete, S.D., Orcino, J.A. New Hope Corporation, Ma-a Davao City**

(Philippines). 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 172. 2019.*

Efficient fertilizer application ensures equal distribution and full absorption of nutrients by the rice crop. Manual broadcasting is the most common method of applying granular fertilizers in the rice fields in the Philippines. Meanwhile, a hexa-copter agricultural precision drone that can broadcast dry materials of a diameter between 0.5mm to 5mm such as granular fertilizers, seeds, and feeds is starting to gain access to the local farming market. With a load capacity of 10kg, the system has automated mission feature wherein users can plot out the area and it automatically creates and follows flight path. The drone is also capable of resuming its mission path after refilling should it emptied its tank load at midflight. The potential of this technology in nutrient application in rice has not been explored. Thus, a study under the field condition at PhilRice CES from January to May 2019 was conducted to test and compare the efficiency and effectiveness of the precision drone spreader technology with manual method in applying granular fertilizer in rice. Cutting the recommended nutrient rate into two splits, granular fertilizers were applied in two plots through the following treatments: manual broadcast and drone spreading. Crop cut and actual yield data as well as the time spent during the application were recorded and analyzed. Results showed that the drone-spread plot has more equal distribution of nutrients based on crop cut compared to the manually broadcasted. Drone-spread plot harvest data was higher compared to the manually broadcasted plot both in the crop cut and actual yield. In terms of the duration of the fertilizer application, both are relatively equal. The results suggests that multi-purpose precision drone spreader has the same efficiency and is more effective than manual fertilizer broadcasting. This experiment will be continued in the next seasons under more rigorous design.

ORYZA SATIVA; FERTILIZER APPLICATION; APPLICATION RATES; TECHNOLOGY; TECHNOLOGY TRANSFER; EQUIPMENT

Growth yield and postharvest quality of lettuce (Lactuca sativa L.) in response to nitrogen application and methods of irrigation under open-field cultivation. **Salinas, E.P., Gonzaga, N.R., Taylaran, R.D. University of Science and Technology of Souther n Philippines, Claveria Campus, Claveria, Misamis Oriental (Philippines). Coll. of Agriculture. Gonzaga, A.B. Jr., University of Science and Technology of South ern Philippines, Claveria Campus, Claveria, Misamis Oriental (Philippines). Rese arch Development and Extebsion Office.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City

(Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 30. 2019.*

The study 'Growth, Yield, and Postharvest Quality of Lettuce in Response to Nitrogen Application and Methods of Irrigation under Open-Field Cultivation' conducted on August-October 2016, and February-April 2017 at University research area, Claveria, Misamis Oriental [Philippines], evaluated growth, yield, and postharvest quality of head-type and leafy-type lettuce as influenced by levels of nitrogen application and methods of irrigation. A (2 x 4 x 2) factorial in Randomized Complete Block Design (RCBD) with 16 treatments replicated three times was established. Types of irrigation system were designated as Factor A, levels of nitrogen were designated as Factor B and variety as Factor C. Each treatment plot measured 1m x 2.5m (2.5m2) Plant stand, number of leaves, crown size, dry matter, and marketable and nonmarketable yield in tons per hectare, weight loss, shriveling and selected climatic factors were gathered and analysed for interaction effects. Analysis of Variance (ANOVA) using RCBD was computed and Tukey's Studentized Range Test run with ASSISTAT 7.7 was used to test significant differences among treatment means. Return on Investments (ROI) was computed using Excel. Growth and yield of lettuce responded positively with drip irrigation, and 50 g Nitrogen application while postharvest quality declines with over Nitrogen application. Temperature, relative humidity and rainfall, within the cropping season also help increase the growth and yield of lettuce. Return on Investments (ROI) in both varieties for drip irrigated lettuce is 10% higher than manual but, 20 % higher ROI was earned by lettuce with no additional nitrogen, The ROI's of the other levels of Nitrogen, between varieties are comparable with each other. Therefore, farmers in the area may start adopting drip irrigation systems for higher income and sustainable lettuce production.

LACTUCA SATIVA; LETTUCES; VARIETIES; NITROGEN; FERTILIZER APPLICATION; GROWTH; CROP YIELD; TRICKLE IRRIGATION

Information acquisition and conservation farming practices for sustainable agriculture in rural Vietnam. **Thi Quynh Anh Le. Hue Univ. (Vietnam). Faculty of Economics and Development Studies. lethiquynhanh25@gmail.com., Shimamura, Y. Kobe Univ. (Japan). International Cooperation Studies. Yamada, H. Keio Univ., Tokyo (Japan). Faculty of Economics.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 18 (1) p. 31-48. 2021.*
https://ajad.searca.org/article?p=1226

Soil fertility conservation has become an increasing concern in Vietnamese agriculture owing to the excessive use of agrochemicals. The use of organic fertilizers is considered an environment-friendly practice for sustainable agriculture. Although environmental

awareness has emerged and production technologies of organic fertilizers have been introduced in recent years, their adoption remains limited among farming households. This study focuses on the causal effects of information acquisition on the use of organic fertilizers from agricultural extension services and from peers of farming households. The estimation results show that land size, land tenure, educational level, family labor endowment, and household wealth are significantly associated with the likelihood of using organic fertilizers. Information acquisition through both information sources positively affects the use of organic fertilizers. However, information acquisition from agricultural extension services has a greater marginal impact than that from peers. Despite its lower influence, information acquisition from peers plays a supplemental role in incentivizing farming households to use organic fertilizers as an environment-friendly agricultural practice among rural communities in Vietnam.

AGRICULTURE; FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; ORGANIC FERTILIZERS; DIFFUSION OF INFORMATION; VIET NAM

Nutrient use efficiency and performance of cabbage (Brassica oleracea L.) genotype in response to levels of N-fertilizer. **Aquino-Allego, C., Gonzaga, A.B. Jr., Gonzaga, N.R. University of Science and Technol ogy of Southern Philippines, Claveria Campus, Claveria, Misamis Oriental (Philippines). Coll. of Agriculture.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 31. 2019.*

Cabbage is one of the major crops grown in Claveria, Northern Mindanao [Philippines] which is well fertilized with various Nitrogen levels (N). A study to determine the nitrogen use efficiency (NUE)using two (2) cabbage cultivars (Resist Crown and KEX 734) as test species was conducted for two (2) cropping seasons, June to September 2016 (first cropping) and on April to June 2017(second cropping), respectively at the Agricultural Experiment Station of the University of Science and Technology of Southern Philippines-Claveria. The study was arranged in a Split Plot designed in a Randomized Complete Block Design(RCBD)with three replications. The different levels of nitrogen were designated as the main plot and the varieties subplot. Each treatment plot measured 1m x 7m, wherein N-levels (0-300 kg/ha) were employed as treatments. Key growth, physiological, NUE, postharvest quality and economic efficiency parameters were measured and analyzed. Results revealed that plants fertilized with 250 kg N/ha performed best in yield and yield components (head weight, harvest index, number of leaves and head side), respectively.Similarly, the same level of N obtained highly significant effect in different physiological parameters (dry matter yield, harvest index and relative chlorophyll content). Nutrient use efficiency was highly significant on plants treated with 50 kg N/h.

Contrastingly, higher doses (> 250 kg N//ha), NUE was observed to be declining as opposed to lower N-level. Highest return on investment (ROI) was obtained in treatments having 200 kg N/ha for the first cropping and 300 kg N/ha for the subsequent cropping using Resist Crown variety. Further results revealed that application of higher levels of N up to 300 kg N/ha may optimize the yield and quality of cabbage. However, it is recommended that further verification studies be conducted across other agro-ecosystems to validate the results.

BRASSICA OLERACEA CAPITATA; GENOTYPES; NITROGEN FERTILIZERS; FERTILIZER APPLICATION; APPLICATION RATES; CROP YIELD; NUTRIENT UPTAKE

Productivity and profitability of analysis of coconut (Cocos nucifera L.) as influenced by integrated nutrient management in three provinces of the Philippines. **Crisostomo, S.D. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Dela Cruz, C.D.V. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Polis, M.M., Quilloy, R.B. Phil ippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Reaño, C.E. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no . 1) p. 34. 2019.*

In the Philippines, most coconut farmers only rely on the present indigenous soil nutrient and the practice of fertilizer application is not commonly done because it is costly and labor extensive. This study aimed to see the effect of the different integrated nutrient management practices on the productivity and profitability of standing 'Tall' coconut plantations in three provinces: Palawan, Davao City and Zamboanga City [Philippines]. Five treatments in which application of recommended inorganic fertilizer with microbial fertilizer, Mykovam were applied. Experimental design used was randomized complete block design with three replications. Coconut yield in different treatments across the location ranged from 6-25 nuts/tree or 3.4712.03kg copra/nut/tree. Yield performance of the three experimental sites responded significantly to the fertilizer regimes (p less than or equal to 0.01). In Zamboanga City and Palawan, the full dose of recommended Philippine Coconut Authority's (PCA) fertilizer rate at equal four splits, applied every three months significantly showed the most suitable nutrient management practice yielding 11,252 and 6,247 nuts/ha/yr, respectively. However, the full dose of recommended PCA fertilizer rate at two equal splits, applied twice a year had the highest nut yield of 12,745 nuts/ha/yr in Davao City. The different yield responses were affected by the amount of rainfall or presence of soil moisture. Moreover, in terms of net present value, half dose of recommended fertilizer rate + Mykovam at two equal splits, applied twice a year had the

highest net returns for the three locations. This implied that with proper fertilizer application and with the addition of biofertilizer, the nut and copra yields were increased to high productivity and profitable levels.

COCOS NUCIFERA; COCONUTS; PRODUCTIVITY; PROFITABILITY; FERTILIZER APPLICATION; FERTILIZERS; APPLICATION RATES; PHILIPPINES

Productivity and profitability of cabbage using bio-fertilizers and various mixture of nutrients under Jasaan series. **Dacup, J.B. Camiguin Polytechnic State Coll., Tangaro, 9104 Catarman, Camiguin (Philippines). Inst. of Agriculture. Gonzaga, A.B. University of Science and Technology of Southern Philippines, Claveria Campus, Claveria, Misamis Oriental (Philippines). Inst. of Agriculture.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 32-33. 2019.*

A study on productivity and profitability of cabbage applied within organic, bio-fertilizers, chicken manure and micronutrients was conducted at Research Experiment Station, University of Science and Technology of Southern Philippines (USTP), Claveria, Misamis Oriental from August to December 2018. The study was limited to evaluate the cabbage growth, physiology and yield as well as the cost and return analysis in one cropping season only. It was laid out in split-plot in Randomized Complete Block Design (RCBD) with three main plots namely: (A1) Nutrio, (A2) Mykoplus and (A3) No bio-fertilizer. Different application of nutrients served as sub plots namely: (B1) control, (B2)RRIF, (B3) RRIF + chicken manure. (B4) 1/2 RRIF, (B5) RRIF + chicken manure + BZnCuMo and (B6) 1/2RRIF + chicken manure + BZnCuMo. Keyparameters gathered include: (A) growth parameters: plant stand and number of days to heading, (B) physiological parameters: dry matter yield and relative chlorophyll content, (C) yield and its components: number of leaves per head, head size (polar and equatorial), head weight (marketable and non-marketable), and (D) profitability computed using cost and return analysis. Results revealed that Nutrio can enhance the function of inorganic, chicken manure and micronutrients since it has highly significant value in terms of physiological and yield parameters compared to Mykoplus. The application of RRIF (150-100-160) + chicken manure (5 tons ha-1) have the highest number of leaves per head, head size(equatorial) and head weight which is highly relevant in attaining the maximum yield of 55.931 tons/ha of cabbage and therefore, attained the highest return on investment of 164.46%.

CABBAGES; PLANT PRODUCTION; PROFITABILITY; FERTILIZER APPLICATION; ORGANIC FERTILIZERS

Productivity of Robusta coffee (Coffea canophera) applied with varying levels of nanofertilizers under Jasaan series. **Gonzaga, A.B. Jr., Taylaran, R.D., Gonzaga, N.R., Dollen, A., Yamut, R.M. University of Science and Technology of Southern Philippines, Claveria Campus, Cl averia, Misamis Oriental (Philippines). Coll. of Agriculture.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 29. 2019.*

Nanofertilizers (NF) are synthesized or modified form of traditional fertilizers, bulk materials or extracted from different vegetative or reproductive parts of the plant by different chemical, physical, mechanical or biological methods. A study was conducted at University of Science and Technology of Southern Philippines (USTP) Claveria Campus, Research and Development Experimental Area, (8 degrees 36.59'N, 124 degrees 52.87 'E with an elevation of 580 meters above sea level (masl) under a mesic, Ultic, Haplorthox soil type (Jasaan Series) Claveria, Misamis Oriental from November 2017 to December 2018, to evaluate the effect of NF to Robusta coffee. The study was laid-out following the Randomized Complete Block Design (RCBD), with 5 levels of NFs and a Control, replicated three times. Results revealed that NF has a significant effect on agronomic parameters of coffee, the highest trunk diameter increment was obtained by Treatment 4 (75% nanofertilizer) with 7.17cm and the highest height increment is the treatment 5 (100% nanofertilizer) with 27.63 cm. Meanwhile, Treatment 2 (25% nanofertilizer) obtained the best results in all yield parameters such as fresh weight 18.80 t/ha, marketable green bean with 3.66 t/ha and green coffee bean 3.88 t/ha, it also acquired the lowest non-marketable result in terms of production with 0.22 t/ha. Return on Expenses (ROE) on levels of NFs has shown significant difference in which Treatment 2 which is 25% NF had the highest ROE (289.04).

COFFEA CANEPHORA; GROWTH; FERTILIZER APPLICATION; APPLICATION RATES; AGRONOMIC CHARACTERS

Response of tobacco to impact of arbuscular mycorrhizal inoculation and application of some micro and macronutrients. **Yari, P., Pasari, B. bpasary@yahoo.com., Shaaf, S. Islamic Azad Univ., Sanandaj (Iran). Dept. of Agronomy and Plant Breeding.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 238-246. 2019.*

To study the response of tobacco to the impact of arbuscular mycorrhizal inoculation and the application of some micronutrients and macronutrients, an experiment was conducted in Marivan City, northwestern Iran during the 2014-2015 growing season. The experiment

used split plot in a randomized complete block design with three replications. The main factor was no inoculation and inoculation by arbuscular mycorrhiza (Glomus intraradices) while subplots used foliar application of some micronutrients and macronutrients in five treatments: control (distilled water), zinc-boron-(micronutrient), potassium-(macronutrient), and zinc + boron + potassium salts. The results showed that the number of leaves and the leaf dry weight in the middle leaves, and the relative water content in the upper leaves of tobacco were significantly affected by mycorrhizal inoculation. Mycorrhizal inoculation resulted in increased number of leaves and leaf dry weight in the middle leaves and increased relative water content in the upper leaves. Foliar application of micronutrients and macronutrients significantly affected the leaf dry weight in the lower leaves, and the number of leaves and leaf dry weight in both the middle and upper leaves. Mean comparison of the lower leaves showed that the maximum value of leaf dry weight was achieved by foliar application of zinc salts. Also, in the middle leaves, the maximum number of leaves was achieved by application of boron salt; leaf dry weight by application of zinc salt; and finally in the upper leaves, the maximum number of leaves was achieved by application of zinc salt, and leaf dry weight by foliar application with potassium salt.

TOBACCO; GLOMUS INTRARADICES; INOCULATION; FOLIAR APPLICATION; FERTILIZATION; LEAVES; TISSUE ANALYSIS; SOIL ANALYSIS

Synthesis and characterization of nano zinc oxide foliar fertilizer and its influence on yield and postharvest quality of tomato. **Ybañez, Q.E. qeybanez@up.edu.ph., Sanchez, P.B., Badayos, R.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural Systems Inst. Agravante, J.U. Philippines Univ. Los Baños, College, Laguna (Philippines). Postharvest Horticulture Training and Research Center.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 55-65. 2020.*

Nanoparticles of ZnO were synthesized via an alkaline precipitation technique that is ideal for large-scale and cost-effective production, using ZnSO4 and ZnCI2as starting materials. Scanning electron microscopy (SEM) analysis revealed that rod-shaped ZnO crystals with nanoscale dimensions were produced from both precursors, but ZnCI2 produced smaller and less aggregated crystals compared to ZnSO4as starting material, we refined the synthesis parameters by varying the solution pH and temperature, drying and calcination temperature, and adding cationic surfactant. Scanning electron microscopy – energy dispersive xray spectroscopy (SEM-EDS) analysis verified the nano size of ZnO (average of 45 nm via SEM), with low degree of aggression, and high chemical purity (59.96% Zn via EDS). X-ray diffraction (XRD) patterns identified hexagonal wurtzite structure with high crystallinity. Mineralogical analysis by X-ray fluorescence (XRF) showed that the nano ZnO were free impurities (90.39% ZnO) while FTIR analysis authenticated the presence of Zn and O bonds. There was sufficient evidence to conclude that nano ZnO with high chemical

purity, and suitable characteristics as Zn foliar fertilizer source, was successfully synthesized using ZnCl2as starting material. The synthesized nano ZnO (SNZ) was tested as foliar fertilizer on pot-grown 'Marimar' F1 tomato, and compared with bulk ZnO (BZ), commercial nanoZnO (CNZ), and granular zinc sulfate (ZS). Boric acid was incorporated to a separate set of the Zn foliar treatments (SNZ+B, BZ+B, CNZ+B, ZS+B) to determine the synergistic effects of Zn and B on the growth and yield of tomato. SNZ+B resulted in positive responses in Zn and B uptake and dry matter yield. Marketable yield was found to be significantly highest in SNZ+B. Statistically, SNZ+B was either better than or equal to the SNZ and CNZ+B treatments in terms of the growth and yield parameters. SNZ+B also led to significant improvements in fruit quality, including higher TSS, %TA, and ascorbic acid content. SNZ enhanced the agronomic effectiveness of Zn foliar fertilizers as evident in the improvements in yield components of tomato. Nano-scaling made ZnO more available to stomates, making nutrient use more efficient .It also resulted in increased number of particles per unit weight of applied Zn, while increasing the specific surface area and solubility of ZnO in water, thus enhancing plant uptake which ultimately led to improvements on yield as well as postharvest quality.

TOMATOES; FOLIAR APPLICATION; FERTILIZER APPLICATION; PLANT NUTRITION; ZINC

Vegetative growth and nutrient use efficiency of tissue-cultured 'Saba' banana (Musa) plantlets in response to fertigroe sup R N,P, and K nanofertilizers. **Angeles, D.E., Ruzgal, J.J.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. jcruzgal@up.edu.ph., Caballero, G.L., Crodua, A.P. Davao del Sur State Coll., Davao del Sur (Philippines). Dept. of Agroforetry.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 102-111. 2020.*

The study determined the effect of using FertiGroe sup R Nano N (18-0-0), Nano P (0-18-0), and Nano K (0-0-38) nanofertilizers on the growth and nutrient use efficiency of tissue-cultured 'Saba' banana (Musa ABB) plantlets. For 7 wk, conventional fertilizers (CF) and FertiGroe sup R nanofertilizers (NF) were applied to the plantlets at graduated level of the recommended rate (RR). Vegetative growth was monitored weekly. At the end of the experiment, samples were collected for dry matter partitioning and leaf issue analysis. Fertilizer treatment significantly improved pseudostem growth and dry matter production of 'Saba' banana plantlets. Plantlets applied with neither conventional fertilizer (CF) nor nanofertilizer NF (control) produced significantly shorter and thinner pseudostem, and less dry matter compared to plantlets that were applied with NF or CF, regardless of the recommended rate (RR) used. Despite having significantly shorter and thinner pseudostem, plantlets applied with NF at 50% RR and 75% RR produced dry matter comparable to plantlets applied with CF at 75% RR and 100% RR by allocating more dry matter to the leaves. Foliar P concentration was not limiting to the plants and its nutrient concentration in

the leaves did not vary significantly across the treatments. N uptake was highest in plantlets applied with NF at 75% RR (0.187 g) and CF at 75% RR (0.158 g), 100% RR (0.167) and 125% RR (0.173 g). K uptake was highest in plantlets that received NF at 50% RR (0.355 g) and 75% RR (0.358 g) and CF at 75% RR (0.353 g). Nutrient use efficiency of the plantlets was measured using apparent nutrient recovery. Apparent potassium recovery of the plantlets applied with NF was higher compared to that of plantlets applied with CF. The computed optimum RR for FertiGroe sup R N nanofertilizer was 23.5% lower than the computed optimum RR for CF. FertiGroe sup R N nannofertilizer can also increase apparent nitrogen recovery by 36.87% compared to CF.

MUSA (BANANAS); VARIETIES; NUTRITIVE VALUE; SLOW RELEASE FERTILIZERS; FORMULATIONS; CONTROLLED RELEASE; SEEDLINGS; FERTILIZER APPLICATION

Vermicompost technology as a potential climate-smart alternative for rice straw management. **Romasanta, R.R., Sander, B.O. International Rice Research Inst., Los, Baños, 4031 Laguna (Philippines). Soil, Water and Climate Cluster, Sustainable Impact Platform. Calub, B.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural System Cluster.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 36. 2019.*

The Philippines generates a substantial amount of rice straw and majority of the generated residue is subjected to burning. An emerging rice straw management practice that can potentially help mitigate climate change and can provide farmers additional income is the use of vermicompost technology. Many studies have shown that vermicomposting technology. Many greenhouse gases, but most are based on the rice-crops. There is a dearth of data in its effectiveness in rice-based systems, more so, in the Philippine context thus, importance of a thorough and detailed study. The objective of this study was to investigate the effects of vermicast incorporation on greenhouse gas emissions and rice yield. The experiment was conducted in two seasons accompanied with different rice straw management practice. In 2017 Wet Season, straw burning was applied to the whole field. Vermicast was incorporated two days before the transplanting date. In 2018 Dry Season, full incorporation of rice straw was implemented. No vermicast was incorporated during this period was established to check for a retention effect of the vermicast. Results have shown that regardless of the different straw management practice that were applied fro 2017WS and 2018DS, treatments with vermicast incorporation significantly reduced the CH4 emissions by 46.7% and 45.6% respectively. N20 emissions were also reduced for 2017WS (41.5%) and 2018DS (28.2%). Significantly difference in N2O emissions was only observed during the 2017WS. In terms of grain yield in 2017WS, incorporation of vermicast

significantly increased the yield with an output of 4.03 +- 0.40 tons/ha compared to the control (3.41 +- 0.24 tons/ha). Implementation in farmer's field, synergy with other technologies such as alternate-wetting and drying (AWD) and performing life cycle analysis could be ways to truly assess this technology.

RICE STRAW; COMPOSTING; OLIGOCHAETA; GREENHOUSE GASES

F06 - IRRIGATION

Assessment of the Free Irrigation Service Act. **Briones, R.M. Philippine Inst. for Development Studies, 18th Floor, Three Cyberpod Tower, Centris-North Tower, EDSA corner Quezon Ave, Quezon City (Philippines). Clemente, R.S. Department of Science and Technology, Bicutan, Taguig City (Philippines). Inocencio, A.B. De La Salle Univ., 2401 Taft Ave., Manila (Philippines). School of Economics. Luyun, R.A. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Land and Water Resources Div. Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development.** *PIDS [Philippines Institute for Development Studies] (Philippines) Reseasch Paper No. 2020-5. Reseasch Paper No. 2020-5. 1908-3297; 2508-0830. 35 p. 2020.*
https://www.pids.gov.ph/publication/research-paper-series/assessment-of-the-free-irrigation-service-act

The country's irrigation systems have a long history of recovering maintenance cost from farmers. The Free Irrigation Service Act (FISA) of 2018 was a radical departure from this policy. This study is a preliminary assessment of the policy change through an examination of secondary data and collection of primary information through key informant interviews and focus group discussions. The study found that the free irrigation had the potential to benefit millions of individuals, although it only led to a small savings in palay production cost. Moreover, while palay farmers were poorer than the average household, most palay farmers were not poor. Group interviews with farmers and staff from the National Irrigation Administration (NIA) confirmed that the main benefits to farmers of free irrigation was their savings from paying irrigation service fees (ISF). The shift to free irrigation also addressed some of the distort ions associated with cost recovery among national irrigations systems (NIS), such as understatement of irrigation service area and time allocation irrigation created a new regime of incentive with inclear implications to the behavior of NIA staff and irrigators' associations. For instance, farmers may become less demanding of the quality of irrigation service or the usefulness of an irrigation project. The funding for the operation and maintenance of NIS has also declined under the free irrigation policy. While a new funding channel has been opened for communal systems, the level of the operations and maintenance in these systems were constrained by the low level of subsidy and increased difficulty in collectin g contributions from the members of irrigators' associations. The study

urges the government to continue pursuing irrigation management transfers within the con text of free irrigation based on minimum maintenance for NIA and transparent maintenance standards for both NIA and irrigators' associations. It also calls for a sustained and increasing subsidy for operations and maintenance (Q and M), which must be made available only in a performance basis. The government may also explore water saving as a performance criterion for subsidy for Q and M. This study advocates for the transformation of NIA into a service-providing agency specializing in technical assistance to irrigators' associations, contract design, and performance monitoring. Lastly, it recommends for the introduction of a mandatory review comparing the FISA with other social assistance and protection schemes in achieving equity objectives.

LEGISLATION; IRRIGATION; IRRIGATION SYSTEMS; GOVERNMENT; FARMERS

Automating a drip irrigation system using open source electronic platform. **Reselva, M.R., Quiera, P.J.S., Caballong, N.L. nlcaballong@philrice.gov.ph., Dicen, E.M. III., Tallada, J.G., Barroga, R.F. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Technology and Management Services Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 164-165. 2019.*

Drip irrigation is a water-saving controlled irrigation technique that allows slow dripping of water to moisten the soil where the crop is planted. From an elevated water tank, water flows in a system of pipes and ends up in drippers which slowly releases droplets to the soil surface near the base of a crop. Using an open source electronic platform called Arduino, an existing drip irrigation setup at the Future Rice Farm was improved to allow real-time soil moisture sensing, and remote open/close control to pipe valves in a smartphone app. The automation system is composed of a micro-controller which interconnects all the electronic parts, capacitive-type soil moisture sensor, GSM module with sim card, solenoid water valves connected to the pipe system, and a mobile app installed in user's smartphone. The soil moisture sensor, inserted into the soil in strategic sites near the crop base, measures real-time level of soil wetness. This data is transmitted to a program in the microcontroller to determine as wet or dry based on a predefined threshold range values. The microcontroller sends feedback to the user's smartphone app via the GSM module. The user can send in command through the app to open the solenoid water valve to release the water if the sensor reading is dry. Once the soil sensor reading reached the required soil moisture level, the solenoid valve automatically closes. The current status of the solenoid valves and soil moisture are also displayed in a small LCD screen at the microcontroller. The system is powered using low-wattage solar power kit.

TRICKLE IRRIGATION; IRRIGATION SYSTEMS; AUTOMATION; SENSORS; COMPUTER APPLICATIONS; COMPUTER SOFTWARE

Growth yield and postharvest quality of lettuce (Lactuca sativa L.) in response to nitrogen application and methods of irrigation under open-field cultivation. **Salinas, E.P., Gonzaga, N.R., Taylaran, R.D. University of Science and Technology of Souther n Philippines, Claveria Campus, Claveria, Misamis Oriental (Philippines). Coll. of Agriculture. Gonzaga, A.B. Jr., University of Science and Technology of South ern Philippines, Claveria Campus, Claveria, Misamis Oriental (Philippines). Rese arch Development and Extebsion Office.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 30. 2019.*

The study 'Growth, Yield, and Postharvest Quality of Lettuce in Response to Nitrogen Application and Methods of Irrigation under Open-Field Cultivation' conducted on August-October 2016, and February-April 2017 at University research area, Claveria, Misamis Oriental [Philippines], evaluated growth, yield, and postharvest quality of head-type and leafy-type lettuce as influenced by levels of nitrogen application and methods of irrigation. A (2 x 4 x 2) factorial in Randomized Complete Block Design (RCBD) with 16 treatments replicated three times was established. Types of irrigation system were designated as Factor A, levels of nitrogen were designated as Factor B and variety as Factor C. Each treatment plot measured 1m x 2.5m (2.5m2) Plant stand, number of leaves, crown size, dry matter, and marketable and nonmarketable yield in tons per hectare, weight loss, shriveling and selected climatic factors were gathered and analysed for interaction effects. Analysis of Variance (ANOVA) using RCBD was computed and Tukey's Studentized Range Test run with ASSISTAT 7.7 was used to test significant differences among treatment means. Return on Investments (ROI) was computed using Excel. Growth and yield of lettuce responded positively with drip irrigation, and 50 g Nitrogen application while postharvest quality declines with over Nitrogen application. Temperature, relative humidity and rainfall, within the cropping season also help increase the growth and yield of lettuce. Return on Investments (ROI) in both varieties for drip irrigated lettuce is 10% higher than manual but, 20 % higher ROI was earned by lettuce with no additional nitrogen, The ROI's of the other levels of Nitrogen, between varieties are comparable with each other. Therefore, farmers in the area may start adopting drip irrigation systems for higher income and sustainable lettuce production.

LACTUCA SATIVA; LETTUCES; VARIETIES; NITROGEN; FERTILIZER APPLICATION; GROWTH; CROP YIELD; TRICKLE IRRIGATION

Measuring the performance of communal irrigation systems in Bohol, Philippines. **Alegado, J.L.G. University of San Carlos, Cebu City (Philippines). jgalegado@up.edu.ph., Pabuayon, I.M. impaubayon@up.edu.ph., Catelo, S.P., Camacho, J.V. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). jvcamacho1@up.edu.ph.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 16 (2) p. 25-43. 2019.*

This study aims to measure the performance of communal irrigation systems (CIS), using cropping intensity and farm yield as indicators. In particular, the study focused on the importance of collective action and how it affects the performance of CIS as a form of irrigation system in the Philippines. The unit of analysis used is the irrigators' association (IA) that manages a CIS across the province of Bohol, Philippines. Analysis of variance was used to determine whether there are significant differences in the performance indicators among the three IA classifications. Likewise, Tobit analysis and ordinary least squares estimation method were used to determine the significant factors that influence cropping intensity and farm yield as performance indicators. The results showed that excellent-rated associations have significantly higher cropping intensity and farm yield than the satisfactory- and fair-rated associations. With respect to the determinants of the performance indicators, labor contribution as a proxy of collective action, has a positive and significant influence on the performance of the irrigation system. Likewise, farm size and farm location have significant and positive effects on cropping intensity and farm yield. However, firmed-up service area and age of the association is statistically significant in farm yield only. To improve the performance of CISs, the study recommends that both monetary and labor contributions must be promoted among farmer-members of each IA.

FARMS; YIELDS; IRRIGATION SYSTEMS; ECONOMIC ANALYSIS; PHILIPPINES

F08 - CROPPING PATTERNS AND SYSTEMS

Airline professional turned her parents' idle land into a farm tourism destination. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 36-38. 2020.*
https://agriculture.com.ph/2020/07/13/airline-professional-turned-her-parents-idle-land-into-a-farm-tourism-destination/

VEGETABLES; VEGETABLE CROPS; FRUIT TREES; LIVESTOCK; FARMING SYSTEMS; FARMS; RURAL AREAS; TOURISM

Bank chairwoman also runs an educational garden destination. **Taculao, P.B.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 22-25. 2021.*
https://agriculture.com.ph/2020/08/03/pnb-chairwoman-also-runs-a-diverse-and-educational-garden-destination-part-1/

CROPS; LIVESTOCK; FARMING SYSTEMS; ORNAMENTAL PLANTS; DOMESTIC GARDENS; GARDENING; FARMS; RURAL AREAS; TOURISM

Bulacan [Philippines] mango orchard gains new life as a leisure family farm. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 23-24. 2021.* https://agriculture.com.ph/2020/09/02/a-mango-orchard-in-bulacan-is-now-a-leisure-family-farm/

MANGIFERA INDICA; MANGOES; FARMS; ORCHARDS; FRUIT TREES; FISHES; CHICKENS; DUCKS; FARMING SYSTEMS; PHILIPPINES

Cavite [Philippines] interior designer is also a weekend farmer. **Mendenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 28-31. 2021.* https://agriculture.com.ph/2020/08/18/this-interior-designer-is-also-a-weekend-farmer/

FRUIT TREES; LIVESTOCK; POULTRY; FARMS; FARMING SYSTEMS; RURAL AREAS; TOURISM; APICULTURE

Contract farming through tea-horticulture intercropping system: a case study of Gambung Estate and horticultural farmers in Bandung, Indonesia. **Sita, K. kralawi.sita@gmail.com., Rosyadi, A.I. air_gambung@yahoo.com., Aji, T.M. Indonesian Research Inst. for Tea and Chinchona, West Java (Indonesia). trimarutoaji@gmail.com.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 15 (1) p. 75-85. 2018.* https://ajad.searca.org/article?p=720

Contract farming is becoming a viable form of partnership between tea plantation companies and local farmers in the management of tea plantations. This study aimed to: (1) describe a contract farming pattern through the system of intercropping tea-horticulture, (2) analyze the efficiency of the management of tea garden with contract farming, and (3) describe the benefits and sustainability of the contract farming between Gambung Estate and horticultural farmers. The case study was conducted in Gambung Estate using qualitative descriptive analysis and contract farming scheme analysis. The study observed that the contract farming patterns applied was a modified nucleus estate model with a combination of resource provisioning cooperation with production management cooperation. The challenges for future contract farming include land management, new skill transfer, climate change, and shared risk and effort between the two parties so that the bargaining position of horticultural farmers will be increased in the sustainable tea plantation management framework. Value of investment efficiency was 47 percent for new

planting and 49 percent for replanting. The highest R/C and B/C values were given to the intercropping system of tea-chili at 2:25 and 1:25, respectively.

CAMELLIA SINENSIS; TEA; HORTICULTURE; INTERCROPPING; CONTRACT FARMING; FARMERS; INDONESIA

Couple with no agriculture background developed a farm for retirement. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 57-59. 2021.* https://agriculture.com.ph/2020/09/10/couple-with-no-agriculture-background-developed-a-farm-for-their-retirement/

VEGETABLE CROPS; ZEA MAYS; ORYZA SATIVA; FARMING SYSTEMS; LIVESTOCK; CHICKENS; FARMS; RURAL AREAS; TOURISM

Diverse agroforestry farm has been in business for 28 years. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 24(8) p. 61-63. 2020.* https://agriculture.com.ph/2020/07/15/a-diverse-agroforestry-farm-thats-been-in-business-for-28-years/

CROPS; FOREST TREES; FRUIT TREES; FARMS; FARMING SYSTEMS; RESOURCE MANAGEMENT; APIDAE; APICULTURE; AGROFORESTRY

Effect of tillage systems on soil properties and yield of wheat and rice in rotation. **Shumin Liang. Yunnan Province Academy of Agricultural Sciences, Kunming Yunnan (China). Industrial Crops Research Inst. Ruizhi Xie Chinese Academy of Agricultural Sciences, Beijing (China). Key Laboratory of Crop Physiology and Production, Ministry of Agriculture. Zhu Zheng. Yunnan Vocational and Technical College of Agriculture, Yunnan (China). Muhammad Abdul Rehman Rashid. University of Agriculture Faisalabad, Subcampus Burewala (Pakistan). Yonglu Tang. Sichuan Academy of Agricultural Sciences, Chengdu, Sichuan (China). Inst. of Crop Science. Yuee Liu. Chinese Academy of Agricultural Sciences, Beijing (China). Key Laboratory of Crop Physiology and Production, Ministry of Agriculture. Jinzhong Yang. Qingdao Agricultural Univ., Quingdao, Shandong (China). Coll. of Agronomy and Plant Protection. Chaosu Li. Sichuan Academy of Agricultural Sciences, Chengdu, Sichuan (China). Inst. of Crop Science. Bing Chen. Xinjiang Academy Agricultural and Reclamation Science, Shihezi (China). Shaokun Li. Chinese Academy of Agricultural Sciences, Beijing (China). Key Laboratory of Crop Physiology and Production, Ministry of Agriculture. lishaokun@caas.cn.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 38-46. 2020.*

Effect of four tillage systems (1) winter wheat and rice rotary tillage (WRRT) (CK), (2) winter wheat and rice no-tillage system (WRNT), (3) winter wheat no-tillage and rice rotary tillage (WNRR), and lastly, (4) winter wheat and rice no-tillage in a raised bed (WRNB) on soil properties and crop yields was investigated in a field experiment in 2004-2010 in a wheat-rice crop rotation on the Chengdu Plain, China. The WRNT system significantly increased the saturated hydraulic conductivity and water infiltration relative to the WNRR and the WRRT (CK) systems. The soil cone penetration resistance was greater in certain soil layers beneath the three systems, compared to the CK system ($P<0.05$). The three tillage systems also significantly increased soil erodibility K ($P< 0.05$) and soil organic matter (SOM) ($P< 0.05$) in certain soil layers but had no significant differences in the soil bulk density, total porosity, and specific gravity among the four tillage systems. Additionally, WNRR improved the wheat yield by 4.0% and rice yield by 8.8% relative to CK.

RICE; WHEATS; CROPPING SYSTEMS; CROP YIELD; CROP ROTATION; PLANT PRODUCTION; SOIL CHEMICOPHYSICAL PROPERTIES; SOIL; CONSERVATION TILLAGE; ZERO TILLAGE; TILLAGE

Family rest house is now an agritourism site that offers a taste of real Filipino charm. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p. 40-42. 2021.* https://agriculture.com.ph/2020/08/24/family-rest-house-opened-as-an-agritourism-site-that-offers-a-taste-of-real-filipino-charm/

VEGETABLE CROPS; FRUIT TREES; FARMING SYSTEMS; CHICKENS; INDIGENOUS ORGANISMS; DUCKS; RURAL AREAS; TOURISM; FARMS

Family works hand-in-hand to manage a mango and vegetable farm in Batangas [Philipines]. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 6-8. 2021.* https://agriculture.com.ph/2020/10/02/family-works-hand-in-hand-to-manage-a-mango-and-vegetable-farm-in-batangas/

MANGIFERA INDICA; MANGOES; VEGETABLE CROPS; PLANT ESTABLISHMENT; CROP MANAGEMENT; CROPS; PHILIPPINES

Farmers' assessment of impacts of wart pigs (Susphilippensis Nehoung) on agroforestry system in Mt. Makiling Forest Reserve, Laguna, Philippines. **Casico, R.S.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Agroforestry. racosico@up.edu.ph., Flores, L.M. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Visco, R.G. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources. Balibot, J.B. Philippines Univ.**

Los Baños, College, Laguna (Philippines). Forest Biological Sciences Dept. *Ecosystem and Development Journal (Philippines). 2012-3612. v. 7 (1) p. 3-13. 2017.*

The assessment of social and economic impacts of Philippine warty pigs (Sus philippensis Nehring) degradation on agroforestry crops was studied at the Mount Makiling Forest Reserve (MMFR) in 2012. This was done through structural survey among the farmer-respondents and farm monitoring to locate the physical damage caused by warty pigs using Global Positioning System (GPS). The attitudes of farmers toward warty pigs were analyzed based on symmetric five-point scale from strongly disagree to strongly agree. A total of 160 farmers were interviewed, however, only 50 farmers were affected by warty pig degradation on crops. Results showed that tubers are the main diet of Philippine warty pig. Damaged root crops include gabi (Dioscorea esulenta (L.)(Schott), cassava (Manihot esculenta Crantz), ginger (Zmigiber officinale Roscoe), sweet potato (Ipomoea batatas (L.) Lam.), and ubi (Dioscorea alata L.), eithe r through direct foraging on trampling. Estimated monetary losses from annual root crops was greatest in ubi amounting to PhP 7,712.60/ha/yr while the least was in ginger (PhP 105.00/ha/yr) across the affected farmer-respondents. The physical evidences found were footprints/tracks, wallowing, bark injury due to their tusks, rest area/beddings and rooting. With regards to farmer's perception on the damage of warty pig, only 20% strongly agreed on the occurrence of serious damage while more than one-third (42%) of the farmers are providing significant protection to their agroforestry crops/farm. The existence of woody perennials provides another source of income for the household in the event of warty pig damage on the root crops. Agroforestry provided protective functions on farming inside MMFR.

AGROFORESTRY; ENVIRONMENTAL DEGRADATION; ENVIRONMENT; ENVIRONMENTAL IMPACT ASSESSMENT; ECONOMIC ANALYSIS; SWINE

Farmers' perception on the sustainability of a Rubber- Based Agroforestry System as a climate change adaptation strategy in Agusan Del Sur and North Cotabato, Philippines. **Furoc-Paelmo, R. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Cosico, R.S.A., Cabahug, R.E.D., Castillo, A.K.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Agroforestry. Castillo, A.S.A., Visco, R.G. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 45-60. 2018.*

This documentation research sought to evaluate the effectiveness of rubber-based agroforestry typologies as a climate change adaptation strategy in the major rubber producing regions in the Philippines, particularly in Agusan del Sur and North Cotabato [Philippines]. It focused on the understanding/perception of the RBAS farmer respondents

on climate change and their account of its influence on the production system and their coping mechanisms. Among the farmer respondents, drought (El Niño), typhoon, strong winds, heavy rains/excessive rainfall, flash floods and landslides are among the common evidences of climate change. Generally, most of the adaptation strategies employed is through cultural management practices like minimized usage of inorganic fertilizer and chemical pesticides from Agusan del Sur farmer respondents while some of the farmer respondents in North Cotabato employed organic farming practices to adapt to climate change. For both provinces, farmer respondents particularly identified agroforestry and diversified farming system as an effective adaptation strategy. Results proved the potential of the rubber-based agroforestry system to evolve as a resilient farming practice to adapt to climate change vis-a-vis stable biological and economic productivity, controlled occurrence of pest and diseases and minimized detrimental effects of climate change on the agroforestry farm component as a whole.

RUBBER; AGROFORESTRY; FARMERS; PARTICIPATION; CLIMATIC CHANGE; CLASSIFICATION; PHILIPPINES; ADAPTATION; CULTURAL METHODS

Feasibility and financial viability study of an intensive mustard-mungbean-transplanted aus rice-transplanted Aman Rice cropping system in a non-saline ecosystem of Bangladesh. **Islam, M.S. Bangladesh Agricultural Research Inst., Bhola (Bangladesh). On-Farm Research Div. Hossain, A. Bangladesh Wheat and Maize Research Inst., Dinajpur 5200 (Bangladesh). tanjimar2003@yahoo.com., Timsina, J. Institute for Studies and Development Worldwide, 8/45 Henley Rd., Homebush West, Sydney, NSW 2140 (Australia). timsinaj@hotmail.com., Saif, H. Bangladesh Agricultural Research Inst., Bhola (Bangladesh). On-Farm Research Div. Sarker, M.M.R. barimamun@yahoo.com., Khan, A.S.M.M.R., Hasan, M.K., Zahan, T. On-Farm Research Div., BARI, Gazipur (Bangladesh). Sabagh, A.E. Kafrelsheikh Univ., Kafrelsheikh (Egypt). Dept. of Agronomy. aymanelsabagh@gmail.com., Akdeniz, H. Igdir Univ., Ziraat Fakultesi, Tarla Bitkileri Bolumu (Turkey). hakki_akdeniz@hotmail.com., Barutcular, C. University of Cukurova (Turkey). Department of Field Crops. cbarutcular@gmail.com.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 73-83. 2020.*

Even as Bangladesh has achieved remarkable progress in food production, especially rice production, there is growing concern about how to feed its increasing population in the future since natural resources such as agricultural land and water are shrinking and undergoing degradation due to climate change. With the country's limited agricultural land area, horizontal expansion from crop production is hardly possible; on the contrary's vertical expansion is possible through increase in crop yield per unit area and reduction of production losses. Such expansion is only possible in the non-saline coastal areas where

overall cropping intensity is lower compared with other parts of the country. To test this hypothesis, an experiment was conducted in a non-saline coastal ecosystem of Bangladesh on 2015-2016 and 2016-2017 to evaluate the feasibility and financial viability of a four-crop-based cropping pattern, i.e., Mustard-Mungbean-T. Aus-T.Amanagainst the farmers' three-crop-based pattern 'Mustad-Dibbling Aus-T.Aman'. After 2 yr, it was observed that the improved cropping pattern produced 19.4 t/ha of rice equivalent yield compared to only 10.7 t/ha in the farmers' cropping pattern. Land use efficiency and production efficiency in the improved cropping patterns were 94.3% and 36.8 kg/ha/d, respectively, compared to only 79.7% and 28.3 kg/ha/d in the farmers; cropping pattern. Gross margin in the improved cropping pattern was 1914 US$/ha whereas it was 924 US$/ha in the farmers' cropping pattern. The marginal benefit cost ration of the four-crop-based cropping pattern was 2.38 over the farmers' cropping pattern. In both patterns, there was negative apparent nutrient balance for K but positive balances for N and P. Based on productivity and economic returns, the study suggests that the improved four-crop-based cropping pattern is feasible and financially viable in the non-saline coastal zone of Bangladesh. These results will also have implications for the adjacent coastal ecosystems in India.

MUNG BEANS; MUSTARD; ORYZA SATIVA; CROP YIELD; SUSTAINABILITY; CROPPING SYSTEMS; CROP MANAGEMENT; FOOD PRODUCTION; ECONOMIC ANALYSIS; COST BENEFIT ANALYSIS; FEASIBILITY STUDIES; BANGLADESH

Former OFW turned coconut farmer earns over P[hp]100,000 a month. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 8-10. 2021.*

COCOS NUCIFERA; CROPS; LIVESTOCK; FARMING SYSTEMS; RURAL AREAS; TOURISM; FARMS; FARMERS; INCOME

Growing coffee brought a local back home to Leyte [Philippines] where she flourished in the trade. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 10-17. 2021.* https://agriculture.com.ph/2020/11/18/growing-coffee-brought-a-local-back-home-to-leyte-where-she-flourished-in-the-trade-part-1-starting-out/

COCOS NUCIFERA; MUSA (BANANAS); COFFEA; PLANTING; INTERCROPPING; PROCESSING; PROCESSED PLANT PRODUCTS; PHILIPPINES

Improvement in self-assessed knowledge and changes in farming system practices of climate field school graduates in Bicol, Philippines. **Ruelos, R.A.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Center for Strategies Planning and Policy Studies. Umali, M.G., Olviga, T.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Villa, R.S., Dr. Emilio B. Espinosa, Sr. Memorial State College of Agriculture and Technology, Mandaon, Masbate (Philippines). Jacobo, E.S.V.**

Alejandro T. Manaog Elementary School, Hacienda Salamat, Cadlan, Pili, Camarines Sur (Philippines). Paunlagui, M.M., Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. acrola@up.edu.ph. *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 4 p. 143-167. 2017.*
https://jpad.cpaf.uplb.edu.ph/articles/improvement-in-self-assessed-knowledge-and-changes-in-farming-system-practices-of-climate-field-school-graduates-in-bicol-philippines/

Rainfed lowland and upland farmers have less access to new technologies especially those that would reduce their vulnerability to climate change. In the Philippines, the Philippine Rice Research Institute developed a package of technology called 'Palayamanan' that is suited to rainfed sites. This paper presents the results of the study that disseminated the Palayamanan technology through the climate field school (CFS) in rainfed areas in Bicol. Thirty-eight farmers from two barangays of Pamplona, Camarines Sur, and 78 farmers from three barangays of Milagros, Masbate were the respondents. A five-point scale was used to self-assess farmers' knowledge on topics discussed in the CFS, which were divided into four major parts: climate science, rice production, vegetable and animal production, and pest and water management. Weighted means of the farmers' self-assessed knowledge scores before and after the CFS were generated. The Mann-Whitney U method was used to test the significance of the differences in the pre-and post-test scores. The differences between pre- and post-test scores were highly significant (at 5% level), especially on the clustered topics of climate, land preparation and seedling establishment, soil nutrient management, pest management, and harvesting. Some farmer-cooperators shifted from traditional crop varieties to high-value crop, thus, changing their farming systems from subsistence to commercial. Farmer-graduates in Pamplona and Milagros have improved self-assessed knowledge and farm practices of some farmer-cooperators also changed, resulting in more advanced farm technologies being adopted in the area. The participants also engaged in new recreational activities such as backyard farming, which became a supplemental source of income. There is need to conduct similar study that investigates other factors or variables that could affect farmers' participation in the CFS. The CFS as a mode of extension delivery in rainfed areas is still in its infancy stage. More funds can be poured into the strengthening of the curriculum as well as capacitating the agricultural technicians to be competent resource persons.

FARMING SYSTEMS; TECHNOLOGY; TECHNOLOGY TRANSFER; DIFFUSION OF INFORMATION; STUDENTS; PHILIPPINES

Manileno familly who moved to Albay [Philippines] finds success on farming and earns over P[hp]60,000 a month. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 35-39. 2021.*

CROPS; FARMS; RURAL AREAS; TOURISM; LIVESTOCK; ORGANIC AGRICULTURE; PHILIPPINES

Manobo-owned coconut farm recovered from deforestation and is now a thriving farm business. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25(4) p. 49-51. 2021.* https://agriculture.com.ph/2020/10/17/in-three-years-a-manobo-owned-coconut-farm-has-recovered-from-deforestation-and-is-now-a-thriving-farm-business/

COCOS NUCIFERA; COCONUTS; VEGETABLE CROPS; FRUIT TREES; PLANTING; POULTRY; LIVESTOCK; FARMS; ORGANIC AGRICULTURE

OFW [Overseas Filipino Worker] established a greenhouse in Sweden to sustain her through long winters. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25(1) p. 43-44. 2021.* https://agriculture.com.ph/2020/06/12/an-ofw-established-a-greenhouse-in-sweden-to-sustain-her-through-long-winters/

VEGETABLE CROPS; GARDENING; GREENHOUSES; FARMS; CHICKENS; DUCKS; TURKEYS; COMPOSTS; FARMING SYSTEMS

Senior citizen's Quezon [Philippines] product of hard work. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 27-28. 2021.* https://agriculture.com.ph/2020/10/03/senior-citizens-quezon-farm-is-the-product-of-hard-work/

ORYZA SATIVA; VEGETABLE CROPS; FRUIT TREES; LIVESTOCK; FARMS; ORGANIC AGRICULTURE

Software engineers establish farm to earn profit and faster food security. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 33-34. 2021.* https://agriculture.com.ph/2020/09/28/software-engineers-establish-farm-to-earn-profit-and-foster-food-security/

FARMS; RURAL AREAS; TOURISM; FARMING SYSTEMS; VEGETABLE CROPS; FRUIT TREES; LIVESTOCK

F30 - PLANT GENETICS AND BREEDING

108 orchid species found in Mt. Busa, Southern Mindanao [Philippines]. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p.56-57. 2021.* https://agriculture.com.ph/2021/04/25/108-orchid-species-found-on-mt-busa-southern-mindanao/

ORCHIDACEAE; SPECIES; ORNAMENTAL PLANTS; BIODIVERSITY; FLORA; RESOURCE CONSERVATION; HIGHLANDS; PHILIPPINES

Binhing Palay App: Philippine modern rice variety catalouge App. **Caballong, N.L. nl.caballong@philrice.gov.ph., Alday, P.A.A. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 165-166. 2019.*

As of 2019, there are 289 modern rice varieties released to farmers and seed growers. Being the host of the national rice cooperative testing of newly-bred rice varieties, PhilRice manages the database of all available rice seed varieties developed by both private and public breeding institutions. This database contains information about potential yield, pest and disease resistance, recommended environment, milling grade, and sensory quality of rice varieties. Binhing Palay (BP) app was developed to deliver this rice variety database through smartphone and tablet devices. Farmers, extension workers, and researchers can filter and sort the list of all rice varieties depending on different categories using the BP app. They can be updated with varieties suited for different environments such as irrigated lowland, rainfed lowland, cool elevated, saline-prone and upland. They can filter information based on seed classification (inbred, hybrid, and special rice), agronomic characteristics (average yield, maximum yield, plant height), and grain quality attributes (amylase content, chalkiness, grain length). The app also offers location recommendation based on reports from DA regional offices, and farmer preferences on survey results. Moreover, a separate page displays the top varieties being promoted by DA and PhilRice. BP App automatically updates whenever a new variety is released through a web-based portal that can be updated by designated content administrator. The app also has an analytics program to monitor actual usage.

ORYZA SATIVA; VARIETIES; DATABASES; COMPUTER SOFTWARE; COMPUTER APPLICATIONS

Characteristics of selected hybrids of abaca (Musa textilis Nee) with resistance to bunchy top. **Parac, E.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Weed Science, Entomology and Plant Pathology. epparac@carsu.edu.ph., Lalusin, A.G. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Pangga, I.B., Sta. Cruz, F.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Weed Science, Entomology and Plant Pathology. fcstacruz@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 1-12. 2020.*

Two abaca hybrids namely, Hybrid 2 and Hybrid 7, which were delivered from a cross between the resistant wild banana (Musa balbisiana) var. Pacol and the susceptible abaca var. Abuab possessing the high fiber quality trait, have been previously selected with promising resistance to bunchy top disease. In this study, the responses of these hybrids to virus inoculation by the aphid (Pentalonianigronervosa) under screenhouse condition and to natural infection in the field were characterized. Under screenhouse condition, Hybrid 7 did not show the bunchy top disease symptoms of dark green streaks on veins and midribs, marginal leaf chlorosis, narrow and stiff leaves or upright and crowding of leaves at the apex of the plant, while Hybrid 2 expressed the disease in only 1 of 15 (7%) plants tested over the 6-mo observation period. The virus was not detectable by enzyme-linked immunosorbent assay (ELISA) using polyclonal antibody against Banana bunchy top virus (BBTV) in all asymptomatic Hybrid 2, Hybrid 7 and 'Pacol'. Plants were confirmed negative for BBTV when tested by polymerase chain reaction (PCR) using the primer pair BBT1 and BBT2 that Amplifies the 349-bp fragment of viral DNA-R component. The response was observed under condition of high disease pressure wherein the susceptible ‘Inosa’ and 'Abuab' developed severe disease characterized by high disease incidence, high amount of disease (measured by the Area Under Disease Progress Curve), and severe symptoms. The results observed under screenhouse condition were consistent with the response to natural infection involving plants that had been grown for 5 yr (2012-2017) in the field located at the Caraga State University, Ampayon, Butuan City, Philippines. Disease index was 4% for Hybrid 2 and 0% for Hybrid 7, indicating a resistant response to bunchy top. Knowledge on the resistance characteristics would be useful information for proper filed development of these hybrids, and for breeding varieties with resistance to bunchy top.

MUSA TEXTILIS; MUSA BALBISIANA; ABACA; HYBRIDS; HYBRIDIZATION; CROSSBREDS; VIROSES; BANANA BUNCHY TOP VIRUS; DISEASE RESISTANCE

Cryopreservation of 'Laguna Tall' coconut (Cocoa nucifera Linn.) mature zygotic embryos. **Kamaunang, J. Indonesian Palmae Crops Research Inst., Manado (Indonesia). jeanettekumaunang@gmail.com., Damasco, O.P. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Protacio, C.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 93-101. 2020.*

'Laguna Tall' coconut (Cocos nucifera L.) zygotic embryos were successfully cryopreserved through cryoprotection using pretreatment-desiccation or vitrification, rapid freezing in liquid nitrogen, rapid thawing at 40 deg C for 2 min, and recovery and growth of frozen embryos in coconut germination medium. Pretreatment in 0.5 M sucrose for 1 d followed

by 24 h desiccation in silica gel gave the highest recovery and complete germination (47%) of cryopreserved embryos. This was followed by 24 h desiccation alone (43%), 3 d sucrose pretreatment + 24 h desiccation (33%), and the least recovery from vitrification using PVS4 solution (13%). Embryo reinvigoration as a post thawing treatment and addition of 0.5 mg/L benzyl amino purine + 1.0 mg/L napthalene acetic acid onto Y3 germination medium hastened recovery and significantly improved complete germination of cryopreserved embryos. The study demonstrated the feasibility of cryopreservation for long-term conservation of coconut genetic resources and for the first time reported on the success in cryopreservation of 'Laguna Tall', an endemic coconut variety grown in the Philippines.

COCOS NUCIFERA; COCONUTS; VARIETIES; FREEZING; BIOLOGICAL PRESERVATION; IN VITRO; IN VITRO CULTURE; EMBRYO CULTURE; GERMPLASM CONSERVATION; PLANT EMBRYOS; DRYING; VITRIFICATION; REFRIGERANTS

Cytogenetic analysis of eggplant (Solanum melongena L.) and some of its wild relatives found in the Philippines. **Callano, K.J.L. Compostela Valley State College, Davao de Oro (Philippines). Agriculture Dept. kjcallano_cvsc@yahoo.com.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (4) p. 362-369. 2020.*

Cytogenetics is known to offer relevant information useful in understanding phylogenetic relationships, genetic mapping and plant breeding studies. In particular, the knowledge of meiotic chromosomal behavior is highly vital in working out pathways for transferring desirable traits from related species to cultivated ones. Cytogenetic characterization of Solanum aethiopicum, S. americanum, S. hirtellum, S. mammosum, S. melongena, S. pseudocapsicum and S. torvum was done using iron-acetocarmine squash technique. S. aethiopicum, S. americanum, S. hirtellum, S. melongena, S. pseudocapsicum and S. torvum were found to be diploid species with chromosome number 2n=24 while S. mammosum had a chromosome number of 2n=22. Lagging chromosomes, bridge formation and asynchronous cell division were observed in insignificant frequencies (1.96–22.06%; 12.07–20.69%; and 1.59–18.18%, respectively). Literature on the basic and applied chromosome features of Solanum species is quite insufficient in the Philippines. Results of this study can be utilized as benchmark information for future interspecific hybridization programs in eggplant.

SOLANUM MELONGENA; AUBERGINES; CYTOGENETICS; CHROMOSOME NUMBER; CHROMOSOMES; PHILIPPINES

Digital genebank for sustainable of precision biotechnology. **Kohli, A. International Rice Research Inst., DAPO Box 7777, Manila (Philippines). Plant Breeding Genetics and**

Biotechnology Dept. 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 2. 2019.*

Crop improvement for food and nutritional security within the sustainable and equitable framework is an imperative with no options. The increasing number of mouths to feed i s the chief driver. Importantly however, changes in the landscape towards urbanization; in socio-economic preferences towards non-agrarian jobs; in fresh water supplies towards depleting reservoirs and in climate patters towards inclement weather events of drought, salinity, submergence, heat and cold, all necessitate concerted efforts towards addressing the land, water, labor and energy challenges facing agriculture. Science and technology are the only recourse for providing the required alternatives and efficiencies that can help us cope with the problems. One mushrooming aspect of science and technology is the digital technologies, which makes extensive data available for relatively easy analysis and predictions for conducting science in a more rapid and precise manner towards the desirable solutions. This talk will describe how various accessions of rice available in the genebank at IRRI [International Rice Research Inst.] can be used through the digitization technologies to food into various programs for crop improvement in a faster and more efficient manner.

GENOTYPES; SUSTAINABILITY; PLANT BIOTECHNOLOGY; TECHNOLOGY TRANSFER

Diversity in Vitex negundo L.: morphological genetic, histochemical and molecular characterization. **Bautista, N.S. Philippines Univ. Los Banos, College, Laguna (Philippines). Plant Biology Div.** UPLB Centennial Professorial Chair Award AY 2019-20. College, Laguna (Philippines). 2020.

Lagundi (Vitex negundo L.) is one of the top ten medical plants being promoted by the Department of Health here in the Philippines. This lecture aims to elucidate the diversity in Vitex negundo L. in the Philippines through morphological, genetic, phytochemical and molecular characterization. It is an offshoot of the preliminary research done since 2010 that started on the genetic profiling of Lagundi using molecular biology markers, i.e. inter-sample sequence repeats (ISSR) to assess the genetic variations in V. negundo found in the fifteen geographic locations in the Philippines. Morphologically, leaf characterization of ten V. negundo germplasm collections from National Plant Genetics Research Laboratory (NPGRL), Institute of Plant Breeding, UP Los Banos, Philippines based on several leaf characters, such leaf types, shape, margin, apex, base, adaxial and abaxial surfaces were characterized. Moreover, foliar trichome anatomy, micromorphology and histochemistry were also evaluated. Based on ISSR markers, there was a common locus or pattern of bands

that is present in all samples from the fifteen geographic locations that can be attributed to the fact that all samples belong from the fifteen geographic locations that can be attributed to the fact that all samples belong to one species. The samples also exhibited a great number of polymorphisms suggesting genetic variation found within the V. negundo species that can be attributed to several factors like climate type, tapography and soil type. The leaf characters and their morphometric analysis have shown to be essential in elaborating the variations found in the ten germplasm collection where two groups have been formed, one with lanceolate leaves and the other a non-lanceolate leaf shape. Additional, intraspecific variations of foliar trichome morphology that can be classified into six morphotypes were found evident in the ten accessions used in the study. The presence of both grandular and non-gradular trichomes as well as their respective types in all accessions suggests that trichome type is a stable character wiyhi the V. negundo accessions. Moreover, foliar trichome histochemistry was carried out to detect the presence or absence of lipid, carbohydrates and secondary metabolites such as terpenes, phenolic compounds, flavonoids and alkaloids. It showed the qualitative variations in terms of contents and localization of the major chemical compounds among the tested V. negundo accessions and between the types of trichomes. The phytochemical variation among accessions of similar species is highly attributed to several factors ranging from genetic, biotic abiotic environmental factors influencing the amount of metabolites present in a plant species and evan in different plant parts. The results revealed from the aforementioned studies on genetic diversity, leaf characterization and morphometrics, and foliar trichome micromorphology and histochemistry provided baseline information an can be a helpful tool in resolving taxonomic discrepancies in V. negundo. It is evident that the phenolic pasticity in V. negundo is high due its adaptation to changes in the environment, thus, it is probable that the active compounds will be different in quantity and potency for each morphotypes/variants. with regard to the future directions for V. negundo research, the availability of a biorepository of medicinal plants is necessary. Biorespository collects, stores, stores, maintains, distributes biological materials of different forms and their associated information for use in future researches. Lagundi samples and other medicinal plants could be deposited in the forms of seeds, extracts, DNA or RNA, and even live plants with their corresponsing vital information. Furthermore, molecular and biotechnological approaches such DNA barcoding will help in the rapid and accurate species identification. Since medicinal plants, such as V. negundo contain numerous active ingredients and complex molecules that are yes to be identified and analyzed, OMIC technologies (i.e. genomics, transcriptomics, preteomics, metabolics, phenomics) are promising and powerful tools that can be used in identyfing genes, proteins, metabolites, mechanics and physiological actions of medicinal plat species. Lastly, because there are also the threats or losing the vast potential sources of our medicinal plants worldwide due to increasing human population as well as as plant consumption. It is imperative to develop breeding

strategies and methodologies concerning the conservation and sustainable usage of medicinal plant resources.

VITEX NEGUNDO; PLANT ANATOMY; MEDICINAL PROPERTIES; CHEMICOPHYSICAL PROPERTIES; DRUG PLANTS; GENETIC MARKERS; GENETIC VARIATION

Farmers preferences in the adaptation and dissemination of white corn as staple food in Eastern Visayas [Philippines]. **Almeroda, B.B., Bulawan, A.D., Palma, J.C.C., Calutan, M.N. Department of Agriculture-Regional Office 8 (Philippines). Abayog Experiment Station. Londina, L.A. Department of Agriculture-Regional Field Office (Philippines). Research Div. Dupal, N.M. Local Goverment Unit-Office of the Provincial Agriculture, Leyte (Philippines). Cabaña, N.N. Local Goverment Unit-City Agriculture Office, Baybay City, Leyte (Philippines). Labios, R.V., Labios, J.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural System Cluster. Manguiat, P.H., Malayang, D.B.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural System Cluster. Manguiat, P.H., Malayang, D.B.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Plant Breeding.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 183. 2019.*

The project have two components: (1) on-farm participatory varietal selection (PVS) and (2) seed system of newly developed improved white corn varieties. The PVS of 11 white corn flint and 1 local variety was conducted at Brgy. Butigan and Brgy. Maganhan, Baybay City Leyte [Philippines] to test yield performance, and adoption compared with farmers' variety during 2015 wet season (WS) and dry season (DS). The varieties/entries used were: IES 10-04, IES 89-10, IPB var6, IPB var8, USM var24, USM var22, USM var28, Northland White, Tupi Red Cob and Pito-pito and Kalimpos as local variety. Results revealed that NGR 800 (Northland white), IES 10-04 and Kalimpos, a local variety, were the top three performing varieties/entries based on yield, preference analysis and sensory evaluation, milling recovery and storage evaluation conducted. Northland white was significantly preferred by the farmers because of its softness, taste like cooked rice, not cohesive, taste good, white when cooked, and long and big ears, medium ear height, and complete kernel rows. Northland and Kalimpos were used for seed system and outscaling and 36 farmers were already availed. Beneficiaries have the chance to harvest and select good quality corn ears in the field instead of giving them shelled corn.

ZEA MAYS; MAIZE; VARIETIES; SELECTION; FARMERS; TECHNOLOGY; TECHNOLOGY TRANSFER; ADAPTATION; DIFFUSION OF INFORMATION; PHILIPPINES

Field screening of high yielding varieties of sugarcane (Saccharum Sp.) for waterlogging tolerance ground in upland and lowland conditions. **Gandia, J.L., Delfin, E.F., Descalsota, M.L.V. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Peña, M.C., Samson, E.G. La Granja Research and Training Station, La Carlota City, Negros Occidental (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 24-25. 2019.*

Severe flooding as a result of climate change may threaten sugarcane yield. The study investigated the effect of waterlogging on lowland and upland-grown sugarcane during the early stalk elongation stage. and screening for waterlogging-tolerant genotypes. In 2017-2018, two split-plot trials at the IPB experimental area (upland trial, Type I climate) and UP La Granja, La Carlota City, Negros Occidental (lowland trial, Type II climate) evaluated the response of ten high yielding varieties (HYVs) to flooding for 2 weeks during stalk elongation stage. Waterlogged sugarcane varieties showed location-dependent differential response in terms of projected ton cane per hectare (tc ha-1) and sugar yield per hectare (LKg/ha). Waterlogging has affected cane and sugar yield with Phil 00-2569, Phil 00-1419, and Phil 2155 accruing losses of 35.8% (30 tc/ha), 32.7 (23.9 tc/ha), and 30.7% (23.9 tc/ha) due to waterlogging, despite out-performing other genotypes on well-drained plots. All other varieties have yields not highly affected by waterlogging, save for Phil 05-1763 that favored waterlogged growth by 36.4% (16.3 tc/ha). Genotype Phil 2003-1389 lost 40.7% (37.73 tc/ha) cane yield in the lowland compared to the uplandsetup. Phil 00-1419, Phil 2155, Phil 2006-1899, Phil 8013, and 200-0791 follow suit losing lowland cane yield by 45.3% (27.3 tc/ha), 31.8% (18.6 tc/ha), 18.9% (12.7 tc/ha), and 20.1% (12.3 tc/ha), respectively, compared to upland conditions. Phil 00-2569, Phil 2006-2289 and Phil 2004-1011 gained 62% (62.1 Lkg/ha), 42,3% (38.6 Lkg/ha) and 33.1% (30.7 Lkg/ha) more sugar yield in the lowand due to superior juice quality. Projected cane and sugar yield for certain varieties have shown to be variable as affected by waterlogging based on location, climate, with certain varieties favoring growth in one area, while growing poorly in the other.

SACCHARUM; SPECIES; SUGARCANE; HIGH YIELDING VARIETIES; FIELD EXPERIMENTATION; WATERLOGGING; CROP YIELD

Four cell analysis: a decision tool for rice conservation and management in Lake Sebu, South Cotabato [Philippines]. **Ferrer, M.C. leferrer83@gmail.com., Nombrere, J.M.Z., Caguiat, X.G.I., Alfonso, D.D., Duldulao, M.D., Santiago, J.C., Reñeses, M.A.M., Castro, J.R. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Dela Cruz, G., Agcopa, V., Ramilo, R. Food and Agriculture Organizations-Philippines (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of

Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 174-175. 2019.*

Lake Sebu, South Cotabato is one the areas in the Philippines with abundant upland rice cultivars. These diverse rice cultivars were acquired from neighboring tribes and passed down through generations. However, these cultivars are facing the brink of extinction. Losing these invaluable cultivars would mean losing part of the indigenous people's heritage. The four-cell analysis was used during the 1st Rice Diversity Seed Fair to assess the status, diversity, and distribution of rice cultivars within the five participating barangays [villages] of Lake Sebu (Klubi, Lamcade, Lamfugon, Luhib, and Tasiman). There was a common pattern between the diversity status and the type of value associated with rice diversity on farms. This common pattern is generally found to be consistent with economic rationales and there are some variations guided by specific household circumstances as well. The value of diversity for each household is reflected by the proportion of population size of variety allocated from the total cultivated area of rice. The analysis revealed which cultivars are commonly grown, rare, unique, and under the threat of extinction. Based from the four cell analysis conducted, farmers listed 97 rice varieties that are still cultivated or still thrive within the five barangays of Lake Sebu. The analysis showed that farmers from Lamfugon enumerated the greatest number of TRVs (35) while Tasiman (15) declared highest number of rice variety lost. Another cell was added where farmers listed their cultivars that were already lost or not cultivated in their respective communities anymore. This gives the farmers, local officials, and students a deeper insight to the status of their rice cultivars. Based from the results of the analysis a decision can be drawn for conservation and management on both in-situ and ex-situ.

ORYZA SATIVA; VARIETIES; BIODIVERSITY; RESOURCE CONSERVATION; GENETIC RESOURCES; DECISION SUPPORT; PHILIPPINES

Functional genomics-and bioinformatics based molecular marker development and utilization in cacao production and varietal improvement. **Barlaan, E.A. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Laurena, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Sales, E.K. University of Southern Mindanao, Kabacan, Cotabato (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 6. 2019.*

Varietal improvement is needed in cacao for increased yield, resistance to pests and diseases and quality. The study aimed to develop molecular markers for utility in cacao

production and breeding. Through functional genomics and bioinformatics, gene and molecular markers were generated using two approaches: 1) genome filtering using methylation-sensitive restriction enzymes and 2) gene mining from cacao genome sequence database. In genome filtering method, genomic DNAs of different cacao cultivars were digested with methylation-sensitive restriction enzymes for ligation, amplification, cloning sequencing and bioinformatics analysis. In gene mining approach, genome sequences were downloaded from the database for bioinformatics analysis. Sequences from both approaches were analyzed for simply sequence repeat (SSR) loci prediction, dereplication, primer development, annotation, homology and gene ontology. Genome filtering method generated 551 perfect SSRs while gene mining produced 3,423 perfect SSRs. Ontology analysis showed that genes were involved in molecular functions cellular components or biological processes. SSR markers were validated for various utilities in cacao. Results revealed SSR markers with unique fingerprints specific to the 12 National Seed Industry Council recommended cacao varieties. This provides molecular identify of each variety since planting materials appear morphologically similar in commercial nurseries. Likewise, identify of true Criollo type the most favored cacao variety for its fine flavor and aroma, has been resolved through fingerprinting and cluster analysis of prospective Criollo and non-Criollo varieties. Phylogenetic analysis of 100 cacao accessions using functional SSR markers showed differences and relatedness of cacao accessions, which provide information for selection of parents in cacao breeding. Association mapping analysis of cacao accessions identified SSR markers that were associated with resistance to cacao pathogens Lasiodiplodia theobromae and Phytophthora palmivora. Overall, the generated SSR markers are effective in discriminating cacao varieties, which could be used further in other cacao varieties grown not only in Philippines but also worldwide.

THEOBROMA CACAO; VARIETIES; PLANT PRODUCTION; GENETIC MARKERS; GENES

Genetic analyses of abaca (Musa textilis Nee) germplasm from its primary center of origin, the Philippines, using simple sequence repeat (SSRR) markers. **Yllano, O.B., Diaz, Ma.G.Q., Lalusin, A.G., Laurena, A.C., Tecson-Mendoza, E.M. etmendoza@up.edu.ph., obyllao@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. 103 (4) p. 311-321. 2020.*

This study presents the first extensive genetic diversity assessment of abaca (Musa textilis Nee) germplasm in the Philippines using simple sequence repeat (SSR) markers. Southeast Asia is the recognized center of origin of the genus Musa, and the Philippines has the most number of abaca cultivars and wild genotypes in the world. In this study, a total of 150 accessions of abaca from Luzon, Visayas, and Mindanao, Philippines and two banana cultivars were analyzed using SSRs to examine their genetic diversity and similarity relationships. Six of 44 banana-based SSR primers were highly polymorphic, detecting 28

alleles with a mean of 4.55 alleles per locus and polymorphism information content (PIC) mean of 0.56. Genetic diversity of abaca in three main islands was high (I = 0.68). Abaca genotypes from Luzon had higher genetic diversity compared to Visayas and Mindanao. Ninety-five (95) percent was attributed to molecular variance within the population and only 5% of the molecular variance to variation among populations. Genetic analysis by Unweighted Pair Group Method with Arithmetic Mean (UPGMA) revealed nine clusters consisting of two big groups and seven small groups, irrespective of geographical origin. Using a combination of SSR markers, the abaca accessions and closely related species could be effectively distinguished and identified putative abaca duplicates. Our results provide genetic evidence of the high diversity of abaca germplasm in the Philippines. The characterization of abaca germplasm using SSR markers will aid in the identification of superior genotypes and for improving the in situ and ex situ abaca germplasm conservation and optimal utilization of abaca genetic resources.

MUSA TEXTILIS; ABACA; GERMPLASM; MICROSATELLITES; GENETIC VARIATION; GENETIC MARKERS; PHILIPPINES

Genotype differences in seed germination and growth, pollen fertility and fruit traits of three promising papaya (Carica papaya L.) F1 hybrids. **Magdalita, P.M. pabsmagdalita@gmail.com., San Pascual, A.O. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 290-299. 2019.*

Papaya F1 hybrids are generally grown by many growers for their hybrid vigor, superior fruit characteristics and moderate tolerance to the Papaya ringspot virus (PRSV). A single-factor experiment conducted in completely randomized design (CRD) with three replications was done to test seed germination, assess seedling growth, and evaluate pollen fertility and horticultural characteristics of three promising papaya F1 hybrids – 5648 x 336 (Liyag), 097 x 4172 (Hirang), and 4173 x 5648 (Timyas). There were significant differences in percent seed germination and seedling height the three papaya F1 hybrids. Hybrid5648 x 336 (Liyag) had the highest seed germination rate (92.20%) and the tallest sedlings (44.73 mm). In the terms of root characteristics, there were significant differences between the hybrids in fresh and dry weights of roots, number and length of secondary roots. Hybrid 5648 x 336 (Liyag) had the heaviest fresh and dry weights of roots and had the highest number of secondary roots while hybrid 097 x 4172 (Hirang) had seedlings with the longest secondary roots. There were significant differences in pollen viability in the three hybrids. F1 hybrid 4173 x 5648 (Timyas) had the highest percent pollen viability (83.33%), and hybrid 097 x 4172 (Hirang) the lowest (73.33%). Pollen viability and pollen germination were high for the six parental inbred lines of the three F1hybrids, but no significant differences were found. In addition, there were significant differences between the three F1 hybrids in fruit weight,

fruit length and flesh thickness. Hybrid 097 x 4172 (Hirang) had red flesh, while hybrid 5648 x 336 (Liyag) and hybrid 4173 x 5648 (Timyas) had yellow orange flesh. The three hybrids are moderately tolerant to PRSV similar to the control cultivar Sinta.

CARICA PAPAYA; PAPAYAS; F1 HYBRIDS; GENOTYPES; GERMINATION; SEEDS; GERMINABILITY; HORTICULTURE; SEEDLINGS; DISEASE CONTROL; PLANT DISEASES; FRUIT GROWING

Hexaploid-tetraploid landraces and wild species of wheat revealed diversity for antioxidants and total phenolics. **Tariq, H. shahidiqbal@upr.edu.pk., Awan, S.I. University of Poonch Rawalakot, Azad Kashmir (Pakistan). Dept. of Plant Breeding and Molecular Genetics. Sabir, S.M. University of Poonch Rawalakot, Azad Kashmir (Pakistan). Dept. of Chemistry. Ilyas, M. University of Poonch Rawalakot, Azad Kashmir (Pakistan). Dept. of Plant Breeding and Molecular Genetics.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 29-37. 2020.*

Wheat contains various phytochemicals, most importantly, antioxidants and polyphenolic compounds that have a variety of health-promoting effects. Seed material was obtained from 63 wheat genotypes of three species (T. aestivum, T. durum, and T. sphaerococcum) from Pakistan and Syria. This study was initiated to estimate and compare the interspecific and intraspecific diversity for antioxidant activity (AOA) and total phenolic content (TPC) in different species of wheat. The wild relatives and landraces of three wheat species exhibited a highly significant interspecific and intraspecific diversity for both traits. T. aestivum exhibited more intraspecific diversity. The AOA of the genotypes ranged from 7.45% to 41.68%, being maximum in accessions of T. durum 12977 (41.68%). TPC ranged from 10.09 to 39.28 mg GAE g-1 and was highest in T. durum accession 12999 (39.28 mg GAE/g). The lowest AOA (7.45%) and TPC (10.09 mg GAE/g) were observed in T. aestivum landrace LR-27. Hence, T. durum accessions 12999 could be our desired accessions for future breeding programs having phytochemicals. Cluster analysis distributed the genotypes into four clusters. Genotypes of different origins grouped differently, indicating an environmental influence in the development of their genetic architecture. Cluster analysis indicated that 41.30% of the genotypes were included in the high AOA and TPC group. Members of T. aestivum that grouped in cluster 1 and 2 showed low to moderate AOA and TPC. The accessions of T. durum and T. sphaerococcum performed much better than T. aestivum for both of the biochemical traits.

TRITICUM; WHEATS; WILD PLANTS; ANTIOXIDANTS; PHENOLIC COMPOUNDS; DIVERSIFICATION; DOMESTICATION; POLYPLOIDY; HEXAPLOIDY; TETRAPLOIDY

Improved water stress tolerance of advanced maize populations derived from open-pollination varieties of IPB Var 6 and IPB Var 13. **Adorado, P.J., Sanchez, Ma. A.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Plant Breeding. Ocampo, E.T. Philippin es Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 26. 2019.*

The Institute of Plant Breeding at the University of the Philippines Los Baños has developed notable white corn varieties IPB Var 6and IPB Var 13 which are known for their superior eating qualities but are also greatly affected by waterlogging and water deficit. Thus, advanced populations derived from these varieties with double stress (drought and waterlogging) tolerance were selected initially under waterlogged and drought conditions. Selections were randomly mated for at least 2 generations, resulting in improved IPB Var 6 populations Cycle 0, Cycle 1, Cycle 2 WLT (waterlogging tolerant), and Cycle 2 DS (double stress-tolerant); and advanced IPB Var 13 populations Cycle 0 and Cycle 1. The advanced populations from both varieties and checks (Hybrid NK 8840, 30G80, Lagkitan and Super Sweet) were grown during 2018 DS in Pangasinan under two different water regimes waterlogging and drought. Randomized Complete Block Design were used for all field experiments. Under waterlogging condition the number of adventitious roots and ears were determined. IPB Var 13 Cycle 1 plants had more adventitious roots (average of 10.51 roots) than IPB Var 6 Cycle 1 (average of 5.32 roots). Under drought stress, the date of tasselling and silking was recorded. The anthesis-silking interval (ASI) ranged from 4.8 days to 7 days, with a mean of 5 days. IPB Var 13 Cycle 1 had the shortest ASI, while IPB Var 13 Cycle 0 had the longest. IPB Var 13 Cycle 1 had a more prolific yield under both water stresses than IPB Var 6-derived populations. Over-all, IPB Var 13 Cycle 1 had the most promising results under stress among the improved populations. These improved populations are planted in different stressed environments to verify stress tolerance and to possibly recommend as alternative varieties for planting during predicted drought periods and in known waterlogged environments.

ZEA MAYS; VARIETIES; WATERLOGGING; DROUGHT STRESS; AGRONOMIC CHARACTERS

Improvement of traditional populations important in the regions through Corn Germplasm Utilization thru Advanced Research Development (CGURRD). **Marfori, Y.C. ycmarfori@up.edu.ph., Macasaet, J.P.A., Cuizon, R.P., Lapiz, J.G.L., Matanggihan, L.T., Sanchez, M.A.B., Beltran, A.K.M., Laude, T.P., Salazar, A.M. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines

Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 156. 2019.*

Riparian vegetation includes plant communities situated in streams, on river banks, and in floodplains; it is an indicator of a river's health. Disturbance affects riparian vegetation by altering the abundance and diversity of plant organisms. In this study, the diversity of riparian plant species of the Binahaan River in Pastrana, Leyte [Philippines] was assessed to show the status of the riparian area along one of the Leyte Metropolitan Water District's (LMWD) main water sources. To assess the diversity of riparian plant species, the transect method was used. A 5x5 m plot was established in every 200 m interval of transect. All plant organisms in the 5x5 m plot were recorded. After one 1 fieldwork, data on 4 sampling points along the river, with varying levels of disturbance, were collected. 31 genera were recorded, from which 28 have been identified. All genera were identified through morphological identification. The Shannon-Wiener Index shows values ranging from 1.431 to 2.255, with the highest observed in Point 3, followed by Point 1, then Point 2, and lowest in Point 4. Simpson's Diversity Index shows values ranging from 0.6808 to 0.8845 with the highest observed in Point 3, followed by Point 1, then Point 4, and lowest in Point 2, suggesting that Point 3 is the most diverse sampling point as it has the highest diversity level shown by both indices. Moreover, there are no endangered or vulnerable plant species observed in the study site. Overall, the results show a low to medium diversity of riparian plant species in the study area.

ZEA MAYS; MAIZE; VARIETIES; INDIGENOUS ORGANISMS; GERMPLASM; GERMPLASM COLLECTIONS

'Kasalath' allele in Nipponbare background is responsible for the plasticity in lateral root development of rice under soil moisture fluctuation stress. **Niones, J.M. Philippine Rice Research Inst., Maligaya Science City of Muñoz, 3119, Nueva Ecija (Phillipines). Genetic Resource Div. Suralta, R.R. Philippine Rice Research Inst., Maligaya Science City of Muñoz, 3119, Nueva Ecija (Phillipines). Crop Biotechnology Center. Inukai, Y., Kano-Nakata, M., Yamauchi, A. Nagoya Univ., Chikusa, Nagoya 464-8601 (Japan). Graduate School of Biographical Sciences. ayama@agr.nagoya-u.ac.jp., rrsmfs@yahoo.com.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 188-198. 2019.*

Soil moisture fluctuations (SMF) from wet to dry and vice-versa are common under field conditions, which influence root growth and functions and thus dry matter production and yield. In such condition, phenotypic plasticity in L-type lateral root (LLR) development is an adaptive mechanism of rice and the associated quantitative trait locus (QTL) was previously detected in chromosome 12, mainly contributed by the 'Kasalath' allele in Nipponbare x

Kasalath chromosome segment substitution lines (CSSLs). In this study, we used +qLLRN-12 genotype of Nipponbare background was used to validate the functions for LR plasticity under SMF and progressive drought. Plants were subjected to well-watered, fluctuations soil moisture and progressive drought conditions for 38 d. There were no significant genotypic differences in shoot growth and root development under well-watered condition. On the other hand, +qLLRN-12 genotype showed greater shoot dry weight by 31% than Nipponbare, which was associated with larger root system of the former than the latter genotype under fluctuating soil moistures. The greater root system development of +qLLRN-12 genotype was attributed to the greater L-type LR development by 95% relative to Nipponbare. However, under progressive drought condition, +qLLRN-12 genotype had reduced shoot dry weight (SDW) due to its smaller root system relative to its fluctuating soil moisture and well-watered counterparts. These results indicate that the introgressed segment of Kasalath on the chromosome 12 region of Nipponbare was responsible for the plasticity in L-type LR, which contributed to greater root system development, increased water uptake and consequently increased dry matter production under fluctuating soil moisture conditions. The findings also suggest that the expression of this allele is unique and triggered only under fluctuating moisture stress conditions.

ORYZA SATIVA; CHROMOSOMES; GENOTYPES; ROOTS; ROOT SYSTEMS; QUANTITATIVE TRAIT LOCI; SOIL WATER CONTENT; SOIL WATER RETENTION; SOIL WATER DEFICIT; RHEOLOGICAL PROPERTIES

Molecular characterization and SSR marker development of KASII and KASIII oil genes in coconut (Cocos nucifera L.). **Monge, J.R., Lantican, D.V., Manohar, A.N.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Plant Breeding. Osio, C.A.L. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Angeles, J.G.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Philippine Genome Center. Diaz, M.G.Q. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Reaño, C.E., Galvez, H.F. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 6-7. 2019.*

Coconut oil, a major product derived from coconut, is a rich source of medium chain fatty acid (MCFA) which is primarily composed of lauric acid (C12:0). Coconut oil has always been extensively sited used a raw material for the oleochemical, food, and pharmaceutical industries, nutritionists have also advocated its consumption for its numerous nutritional benefits. Due to these applications, understanding the role of genes that govern fatty acid synthesis can help develop new approaches on manipulating and improving fatty acid

composition. Two genes involved in MCFA synthesis are the beta-ketoacyl ACP synthases (KAS) 2 and 3, which are responsible for the condensation and elongation of fatty acids. This study reports the first characterization of KAS2 and KAS3 genes isolated from coconut endosperm cDNA. The candidate sequences were used to validate previously predicted sequences of coconut KAS2 and KAS3 genes where KAS2 is validated, while KAS3 has and exon region unmapped in the CATD coconut genome assembly. These genes contained a predicted open reading frame (ORF) of 561 and 409 amino acids for KAS2 and KAS3, respectively. KAS2 is located in genome contig 25, while KAS3 is located in genome contig 13. SSR markers MK299, MK317, MK832, and MK853 were designed based on the location of the genes in the genome assembly and used to genotype a genetic mapping population. MK299 and MK317 exhibited Mendelian inheritance while MK832 and MK853 exhibited segregation distortion. The physical and genetic linkage of the SSR markers were validated. This study characterized and annotated the function of KAS2 and KAS3 from coconut. The findings from this study can be used in annotating the mapped oil genes based on the coconut genome assembly, furthermore the SSRs designed can be used as immediate markers for genetic linkage analysis and quantitative trait loci (QTL) mapping for high yield and outstanding quality of copra oil.

COCOS NUCIFERA; COCONUTS; GENETIC MARKERS; GENES; COCONUT OIL; FATTY ACIDS; GENETIC MAPS

Morphological and cytogenetic characterization of four canna (Canna x generalis L.H. Bailey and E.Z. Bailey) cultivars and two putative F1 hybrids. **Ondoy, J.L. Sultan Kudarat State Univ. Lutayan Campus, Sultan Kudarat (Philippines). Coll. of Agriculture. juareynondoy@sksu.edu.ph., Mendioro, M.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Genetics and Molecular Biology Div. Magdalita, P.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Dela Viña, C.B., Reamillo, M.C.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Genetics and Molecular Biology Div.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 191-200. 2020.*

Four Canna cultivars (C. 'Moonbeam', C. 'Madeira,' C. 'Wintzer's Colossal', C. 'Alphonse Bouvier') and two putative F1 hybrids of C. 'Wintzer's Colossal' and C. 'Alphonse Bouvier' (coded as H3R1 and H3R2, respectively) were evaluated for their morphological and cytogenetic characteristics. Among the morphological parameters reckoned were plant height, culm/stem diameter, flower diameter, flower color, inflorescence length, staminode length and thickness, leaf length, leaf width and leaf thickness. Acetocarmine squash technique was used to determine the chromosome number and chromosome behavior at meiosis I and II. Pollen viability was tested using I2KI test and TTZ test which was further verified through pollen germination test. Meiotic behavior was related to pollen fertility.

Results showed that the four Canna cultivars and two putative F1 hybrids were morphologically variable in plant height, inflorescence length flower diameter and staminode length with measurements of 95.67 – 172.67 cm, 22.33 – 147.67 cm, 6.33 – 11.94 cm, and 9.95 – 45.87 cm, respectively. The flower color of C. 'Moonbeam' is Chartreuse yellow, C. 'Madeira' is Saturn red, and C. 'Alphonse Bouvier' is Vermillion while C. 'Wintzer's Colossal' is Nasturtium red. The color of the two putative F1 hybrids is Chartreuse yellow for H3R1 and Jasper red for H3R2. C.'Moonbeam', C.'Madeira' and the two putative F1 hybrids are diploid with chromosome number 2n = 18, and basic chromosome number x = 9. Although non-congressions and laggards were observed at metaphase I and anaphase I, the chromosome were able to catch up, hence pollen stainability and pollen germination remained high at 90.36% to 94.88% Pollen viability for H3R2 were 95.75% and 90.38%, respectively. C.'Witzer's Colossal' is a triploid with gametic chromosome number of 3n = 27, and a high frequency of irregular chromosome behavior observed during meiosis I and II. It has low pollen stainability based on results of the I2KI test while unstained pollen was observed based on the TTZ test result. C.'Moonbeam' and C.'Madeira' can be used as a female parent as well as a male parent due to their high pollen viability. The two putative F1 hybrids H3R1 and H3R3 had a novel staminode size and attractive colors that ornamental breeders and Canna enthusiasts may find valuable.

CANNA; SPECIES; VARIETIES; ORNAMENTAL PLANTS; F1 HYBRIDS; CYTOGENETICS; HISTOCYTOLOGICAL ANALYSIS; MEIOSIS; CHROMOSOMES; HYBRIDIZATION; PLANT BREEDING; TISSUE ANALYSIS; GERMINATION; POLLEN

Morphological characterization and identification of Pa'uohi'iaka (Jacquemontia sandwincensis A. Gray) accession for hanging basket use. **Antesco, D.K.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Baldos, O.C. University of Hawaii at Manoa, Honolulu, Hawaii (USA). Dept. of Tropical Plant and Social Sciences.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 35. 2019.*

Introduced ornamentals that become invasive have contributed to the decline of native plant species and native plant cover in Hawaii. To mitigate this problem state laws were legislated to actively promote the use of native Hawaii plants as alternative ornamentals. Identifying selections for various horticultural uses such as hanging baskets is required to increase use and variety of native plants. Pa'uohi'iaki (Jacquemontia sandwicensis A. Gray [Convolvulaceae] is an endemic coastal plant identified with potential use for hanging baskets. In the wild, morphological variation exists, but efforts to collect characterize and identify selections for hanging baskets have not been done. The objectives of this study

were to: 1)characterize six accessions collected from the islands of Maui (Ahihi-Kinu, McGregor and Puhala Bay), Oahu (Lyon Arboretum and Shidler College) and Hawaii (South Point) and 2)identify accessions suitable for hanging basket use. Six sample plants from each accession were propagated and allowed to grow for three months under irrigated outdoor conditions. To encourage lateral branching, stems were pruned to inches from the base and allowed to re-grow for one month. Seventeen quantitative and qualitative morphological characters were recorded. Principal component analysis and cluster analysis were conducted to visualize genetic distance and relatedness of each accession and possesses a distinct set of morphological characters. Principal component analysis identified eight morphological characters that contributes to the variation of the six accessions. Cluster analysis revealed that six accessions fall into three groups. Length of internodes and number of lateral branches were the most important trait for selecting accessions for hanging baskets. Among the six accessions, Puhala Bay, Lyon Arboretum and South Point were identified as suitable for hanging basket use.

ORNAMENTAL PLANTS; INDIGENOUS ORGANISMS; GENETIC VARIATION; SELECTION; AGRONOMIC CHARACTERS

Morphological characterization and karyotype analysis of abaca (Musa textilis Nee) and its hybrids with Musa balbisiana Colla. **Labrador, D.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Graduate School. Lalusin, A.G. aglalusin@up.edu.ph., Mendoza, M.R.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Dela Viña, C.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 13-28. 2020.*

To determine if progenies from the cross between Musa textilis Nee (2n =20) and Musa balbisiana Colla (2n = 22) produced at the institute of Plant Breeding (IPB), University of the Philippines Los Bańos are true hybrids, abaca cultivars (Abuab and Inosa), a banana cultivar (Pacol), and their back crosses (BC1, BC2, and BC3) were characterized morphologically and cytogenetically. Agronomic characters and fiber quality assessment through ANOVA and pairwise analysis revealed significant differences in tensile strength and agronomic parameters, anmely, fiber quality and percent fiber recovery, except for leaf sheath number and girth measured at the top. This confirmed the recovery of recurrent parent genome (abaca) until the third generation of backcrosses. Moreover, this study reports the successful optimization of cytogenetic techniques. The most favorable time of root tips collection was from 10:00 a.m. to 10:30 a.m. due to the high number of dividing cells observed compared to other time slots tried. Two-hour cold shock pre-treatment resulted in considerably larger chromosomes, and higher number of well-spread prometaphase cells that helped in the construction of karyograms. Chromosome

characteristics based on chromosome count and relative length were determined and compared among plant samples. Comparative karyotyping revealed a diploid chromosome number of 2n = 20 for abaca cultivars and hybrids. Inosa, another cultivar of M. textilis Nee, was observed to have a diploid chromosome number of either 2n = 20 or 2n = 22, in contrast to an earlier report of 2n = 17 to 2n = 23.

MUSA TEXTILIS; MUSA BALBISIANA; ABACA; HYBRIDIZATION; CROSSBREDS; PLANT ANATOMY; KARYOTYPES; AGRONOMIC CHARACTERS; CHROMOSOMES; MITOSIS

Morphological characterization and SSR-based DNA fingerprinting of cassava (Manihot esculenta Crantz) varieties released by the National Seed Industry Council (NSIC). **Vinarao, G.B. gbvinarao@up.edu.ph., Mendoza, M.R.R. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Villa, N.O., Dela Viña, C.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Abustan, M.A.M. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Lalusin, A.G. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 350-360. 2019.*

The genetic variability of 47 cassava varieties released by the National Seed Industry Council (NSIC) was evaluated through morphological characterization and DNA fingerprinting using simple sequence repeat (SSR) markers. Phenotypic similarities based on 34 morphological descriptors were observed in varieties sharing a common parent. Fifty (50) polymorphic SSR markers were used to construct DNA fingerprints. A total of 648 polymorphic alleles and 764 unique banding patterns were observed among the varieties. The polymorphism information content (PIC) values ranged from 0.46 to 0.95, with an average of 0.83. Each variety had a unique banding profile indicating that SSR markers were useful distinguishing cassava varieties. A wider genetic diversity of cassava varieties was detected in SSR data (70%) compared with morphological data (50%) showing that SSR markers are more effective in determining the extent of variation between genotypes. The DNA fingerprints of cassava varieties have been successfully generated which can be used as a benchmark for identification and authentication of released cassava varieties.

MANIHOT ESCULENTA; CASSAVA; VARIETIES; MICROSATELLITES; NUCLEOTIDE SEQUENCE; GENETIC MARKERS; DNA FINGERPRINTING; GENETIC VARIATION; PLANT ANATOMY

Morphological responses of mungbean (Vigna radiata (L.) R. Wilczek) genotypes under waterlogging stress at vegetative stage. **Arcillas, L.S., Rafanan, K., Delfin, E., Enicola, E. Philippines Univ. Los Baños, College, Laguna (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines

Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 27. 2019.*

Mungbean (Vignaradiata (L.) R. Wilczek) is an important leguminous crop in the Philippines. One of the strategies to mitigate the effects of climate change on mungbean production is through the selection and development of waterlogging-tolerant varieties. Twelve mungbean genotypes were evaluated for waterlogging tolerance at the Institute of Plant Breeding, CAFS, UPLB [Philippines] at the vegetative stage in 2019 Dry Season laid out in RCBD in four replicates. Three-week old seedlings were subjected to 7- and 14-day waterlogging with water level maintained at 2 cm above the soil surface during the stress duration and allowed to drain after the waterlogging period. The selection included Pag-asa 5 and 15, PHL 12881, PHL 12959, five breeding lines (5238, 5240, 5244, 5247, 5248) produced from PHL 12950-G (tolerant) x P19 (susceptible), parentals, and PHL 14296 (check). Significantly higher SPAD recovery, and relative root, stem and leaf weight were observed at 7-day than at 14-day waterlogging. However, the latter had significantly higher mean root score, and adventitious root length and surface area, which can be a response to longer flooding duration. Significant treatment x genotype interaction has been observed on adventitious root length and surface area. Based on the weight of plant parts and SPAD recovery, all breeding lines had comparatively higher growth recovery than the check and parentals. Based on the adventitious root formation, two of these lines (5247 and 5248) have comparable results with the check and PHL 12950-G. Since the relative survival, recovery, and suppression of mungbean genotypes under different treatments showed no significant difference, waterlogging has little effect on plant survival but has a significant effect on growth, which consequently affects production. Shorter stress exposure allowed plants to recover, while longer exposure reduced the recovery of the mungbean plants. Furthermore, the breeding lines showed the potential of improving a susceptible parent,Pag-asa 19, by crossing with a tolerant parent PHL 12950-G.

VIGNA RADIATA; MUNG BEANS; GENOTYPES; WATERLOGGING; STRESS; EVALUATION

Multiple criteria evaluation of National Cooperative Testing (NCT) sites for rice in the Philippine through GIS [Geographical Information System]-aided optimization technique. **Dela Cruz, A.E. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Lansigan, F.P. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 5. 2019.*

The national cooperative testing (NCT) sites for rice production spread across the country have crucial role and contribution to the overall national agricultural development. However, the sites are not at their most efficient and effective locations, and hence require optimization. Through a systems analysis approach, this study analyzed the geographic positions of existing and proposed rice testing sites relative to primary production zones using a set of criteria namely: (1) proximity to agroclimatic zones or ACZ, (2) proximity to research facilities, (3) yield and (4) exposure to hazards. An indicator-based multi-criteria analysis was applied using the geographic information system (GIS) to evaluate the location-based suitability of current NCT sites, as well as to determine optimum locations for new NCT sites' establishment. Study results reveal which NCT sites are optimally located as follow twelve out of 22 sites are within favorable agro-climatic zones, five sites (5/22) are within the 25-kilometer proximity distance to nearest research center, seven sites (7/22) are not exposed to hazards; and nineteen sites (19/22) are in areas with yield of 4 tons/ha. At an equal-weight scenario (25-25-25-25), where each of the four indicators were assigned 25% weight, half of test sites (11/22) are optimally located. However, at customized-weight scenario (30-30-30-10), where yield, agro-climatic zones, and hazards were given 30% weight each, less than half NCT2 (8/22) are optimally located. Moreover, results show that four out of thirteen agro-climatic zones do not have testing sites; and that the findings of the study are suggestive that at least 59 NCT sites should be established to cover all agro-climatic zones at one site per 500,000 hectares. This study determined which NCT sites are optimally sited using only four criteria. Refining this study by inclusion of more indicators is highly recommended but may be limited by data availability.

ORYZA SATIVA; PLANT PRODUCTION; SITE FACTORS; GEOGRAPHICAL INFORMATION SYSTEMS; EVALUATION

New plant species discovered in the Philippines in 2020. **Tan, Y., Bustamante, R.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 60-61. 2021.*
https://agriculture.com.ph/2020/12/20/11-new-plant-species-discovered-in-the-philippines-in-2020/

AMORPHOPHALLUS; BEGONIA; SPECIES; INDIGENOUS ORGANISMS; BIODIVERSITY; PHILIPPINES

Optimizing F1 seed production of pre-commercial public hybids. **Corpuz, M.V. nique4398@gmail.com., Gramaje, L.V. lvgramaje@philrice.gov.ph., Caguiat, J.V., Brena, S.R., Desamero, N.V. Philippine Rice Research Inst. Central Experiment Station, Maligaya, Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific

Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 177. 2019.*

The adoption of public hybrid rice varieties in the Philippines is hindered by the limited supply of F1 seeds highlighting the need for increased seed production efficiency and reproducibility. This study was conducted to determine optimal cross combination-specific to differential seeding technique, and parent row ratio to maximize F1 seed yield. Synchronization of flowering of Mestiso 55 (IR79128A X PR31559-AR32-4-3-2R) and Mestiso 73 (PRUP TG101 x SN758) parents were attained through leaf number method. For Mestiso 55, the CMS line must be sown when the R line is a t 0.25 leaf stage to attain good synchronization. For Mestiso 73, the S line must be sown when P line is at 1.1 leaf stage during the dry season under Nueva Ecija Condition. Seed yield response to different parent row ratios of Mestiso 55 and Mestiso 73 were observed. A x R row crossing plots with 2:6, 2:9, 2:12, and 2:15 female to male parents were established in randomized complete blocks with two replications. Using analysis of variance (a = 0.05), significant treatment mean differences were detected, suggesting that 6:15 row ratio is the most optimal for M55 and 6:12 for M73. Maximum seed yield attained was 1993.07t ha-1 for Mestiso 55, and 1178.39 t ha-1 for Mestiso 73. Seed reproducibility enhancement studies of experimental, and highly adopted NSIC-released rice hybrids with additional approaches are ongoing. The results obtained can be of great help towards developing a demand-responsive hybrid rice seed sector, playing a role in subsequently increasing cultivation of public hybrid varieties.

ORYZA SATIVA; HYBRIDS; FLOWERING; TECHNOLOGY; TECHNOLOGY TRANSFER

Overexpression of maize (Zea mays L.) malate dehydrogenase (ZmMDH) in IR64 rice (Oryza sativa L.) leads to altered carbohydrate metabolism as revealed by transcriptomics and metabolite analysis. **Galang, E.T. etgalang@up.edu.ph., Legaspi, C.L.B. Philippines Univ. Los Baños, College Laguna (Philippines). Genetics and Molecular Biology Div. Lin, H.C., Quick, W.P.G. International Rice Research Inst., Los Baños, Laguna (Philippines). Vila, N.O., Duka, M.A. Philippines Univ. Los Baños, College Laguna (Philippines). Genetics and Molecular Biology Div.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. 103 (4) p. 293-302. 2020.*

Malate dehydrogenase (MDH) (EC 1.1.1.40) is among the major genes identified by the C4 Rice Consortium to play an important part in inducing C4 photosynthesis in a C3 rice system. Despite the vast information on the biochemical characteristics of the enzyme, the effects of engineering maize (Zea mays L.) MDH on IR64 rice (Oryza sativa L.) for the induction of the C4 pathway was never thoroughly studied in the light of transcriptomics. Two transformed IR64 rice events conferring overexpression of maize MDH (ZmMDH), namely MDH 22 and MDH 48, were analyzed using transcriptome analyses to assess

differential expression of endogenous genes due to MDH overexpression. Sugar metabolite quantification was also conducted to identify changes in the concentration of simple and complex carbohydrates against the wild type (untransformed) IR64 rice. Transcriptome analyses revealed 301 differentially expressed genes in transformed rice with significant enriched effects in the downregulation of simple carbohydrate degradation. This result implies lower degradation of sucrose, fructose and glucose content as eight strongly associated genes for this function were downregulated. Carbohydrate characterization revealed significant differences in terms of simple and complex sugar content in MDH 22 and MDH 48, respectively, which aligned with the results of the transcriptome analyses. The resulting phenotype of the MDH-transformed lines indicate an increase in plant height and biomass which can be attributed to the association of growth due to the rapid conversion of simple sugars to starch and traced further to the implied change in the rate of simple sugar degradation. The study successfully established the effect of maize MDH in rice based on its transcriptome, sugar content, and phenotype.

ZEA MAYS; MAIZE; ORYZA SATIVA; RICE; CARBOHYDRATE METABOLISM; MALATE DEHYDROGENASE; ENZYMES; C4 PLANTS; GENES; GENE EXPRESSION

Phenotypic characterization of selected traits in 'Saba' banana (Musa balbisiana), chico (Manilkara zapota) and pummelo (Citrus maxima) for crop improvement. **Magdalita, P.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. San Pascual, A.O. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 112-125. 2020.*

Phenotypic characteristics of 'Saba' banana, chico and pummelo were assessed for variability, clustering patterns and character association of 67 saba clones, 71 chico and 73 pummelo genotypes collected mainly from Luzon [Philippines]. Characters were analyzed for agglomerative clustering and correlation analyses. Five clusters for saba, chico and pummelo genotypes were arbitrarily formed a highly branched dendrogram for each species was generated. In 'Saba', 22 grouped in Clusters 1, 24, 18, 1 and 2 in Clusters 2, 3, 4 and 5, respectively. In chico, 67 genotypes clustered in Cluster 1, while 1 each belongs to Clusters 2, 3, 4 and 5. in pummelo, 37, 4, 29, 2 and 1 genotypes grouped, respectively, in Clusters 1, 2, 3, 4 and 5. High degree of association between characters indicated dependency of certain characters on others, suggesting that evaluation of traits can be reduced to save time, effort and resources during peak of evaluation periods. Eighteen saba clones of Cluster 3, while in Chico, CH7-IPB in Cluster 2 and 41 accessions from Clusters 1 and 2 of pummelo could be used in varietal improvement due to high soluble solids (TSS) and edible portion, heavy fruit weight and size, and few number of seeds for chico and pummelo.

MUSA BALBISIANA; MUSA (BANANAS); VARIETIES; MANILKARA ZAPOTA; CITRUS GRANDIS; PUMMELOS; BREEDING METHODS; GENETIC VARIATION; GENOTYPES; EVALUATION

SSR analysis of Coffea liberica var. liberica and Coffea liberica var. dewevrei in the Philippines. **Santos, D.M.C. daconstantino@up.edu.ph., Cao, E.P. Philippines Univ. Diliman, Quezon City (Philippines). Inst. of Biology.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (4) p. 357-361. 2020.*

In the Philippines, four coffee varieties (Arabica, Robusta, Liberica and Excelsa) are cultivated for commercial consumption. While Arabica and Robusta varieties are well-known globally, Liberica or Kapeng Barako is being developed as Philippine specialty coffee. Liberica and Excelsa are more similar in morphology compared to Arabica and Robusta since they are varieties of the same species, Coffea liberica W. Bull ex Hiern. In this study, 20 SSR markers were amplified for C. liberica specimens representing both Liberica and Excelsa varieties in the Philippines. While the SSR markers exhibited high polymorphism, between-site variation was much greater compared to between-variety. The neighbor-joining tree showed specimens from the same site clustering together with moderate to high bootstrap supports. These SSR markers may be used for geographic origin determination of coffee varieties.

COFFEA LIBERICA; COFFEA ARABICA; COFFEA EXCELSA; MICROSATELLITES; GENETIC VARIATION; POLYMORPHISM; IDENTIFICATION; PHILIPPINES

SSR markers for fingerprinting, hybridity testing and diversity analysis of important varieties and promising lines of papaya in the Philippines. **Cimagala, K.C., Zaporteza, M.M., Dolorais-Laraño, A.C., Garcia, R.N. rngarcia1@up.edu.ph., Tecson-Mendoza, E.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Plant Breeding.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 104 (4) p. 300-309. 2019.*

Simple sequence repeat (SSR) or microsatellite markers were identified for Philippine varieties of papaya for varietal identification, diversity analysis, and hybridity assessment. Fourteen SSR markers were screened using PCR for amplification and polymorphism. Six primer combinations namely, CPMET, BGAL, ACC, CPY, SSR 12 and SSR 35, were effective in fingerprinting and diversity analysis and for hybridity testing, except for CPMET. The genetic relationship of the selected papaya varieties was established based on UPGMA clustering. At 0.76 coefficient of similarity, three groups were observed, namely: Group 1 (Davao Solo, Maradol and Red Lady), Group 2 (Sinta and Cavite Special) and Group 3 (Morado). The heterozygosity of each locus varied from 0.38 to 0.57 with an average of 0.51. ACC, BGAL

and SSR 35 markers were predominated by major alleles with greater or equal to 75 percent. Distinct DNA fingerprints were obtained for the six papaya cultivars, the transgenic papaya lines, backcross lines, recurring parent and hybrids, for hybridity testing, the SSR markers CPY, BGAL, SSR 12 and SSR 35 were able to discriminate the F1 hybrid and its parents. This study shows that the identified SSR markers are effective in analyzing diversity, providing definitive fingerprints and testing hybridity.

CARICA PAPAYA; PAPAYAS; VARIETIES; MICROSATELLITES; DNA; NUCLEOTIDE SEQUENCE; GENETIC MARKERS; DNA FINGERPRINTING; DNA; GENETIC VARIATION; HYBRIDIZATION; PCR

Using anthesis-to-silking interval to identify drought tolerant genotypes from the Philippine nature corn germplasm collection. **Austria, R.E.G., Descalsota, J.C., Ocampo, A.M. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Ocampo, E.T.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 27-28. 2019.*

The Identification of drought-tolerant maize genotypes present in the national germplasm collection is the first step towards the development of locally-sourced planting materials that exhibit adaptability to water scarcity. The analysis of secondary traits resulting from adaptive responses to stress may improve selection efficiency versus the use of grain yield alone, as suggested by several studies showing the significant correlation between the anthesis-silking interval (ASI) and grain yield, particularly under drought stress.To test for the ASI and grain yield relationship under drought stress of the Philippine native corn germplasm collection, 162 maize genotypes from the collection were subjected to drought under field conditions in Sta. Barbara, Pangasinan from January to May 2018. Two replications were set up in a randomized complete block design, considering each individual genotype as a treatment.A specific watering regime for drought tolerance evaluation was applied to coincide with water stress at flowering inorder to maximize the effect on yield performance. Only 27% of the screened genotypes produced sufficient data for correlation analysis. Ear length, ear diameter, number of ears, and moisture content observations indicated positive correlation with grain yield ($p < 0.01$, 0.92, 0.89, 0.83, and 0.17NS.respectively), while ASI had negative correlation ($p < 0.01$, -0.34). ASI ranged from 3-7 days in the top 10tons/ha) had ASI ranging from 5-8 days. Grain yield decreased by approximately 3.33% per day with increase in ASI up to 6 days. Data suggest that drought-tolerant maize genotypes may be selected from the Philippine corn germplasm collection effectively through secondary trait evaluation, particularly ASI, in conjunction with a strategic watering scheme.

ZEA MAYS; INDIGENOUS ORGANISMS; GENOTYPES; DROUGHT RESISTANCE; DROUGHT STRESS; FLOWERING; PHILIPPINES

Variation in shoot and root responses of eggplant(Solanum molengena L.) under mild drought and flooding conditions. **Masanga, A.P.L., Hautea, D.M. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Suralta, R.R. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Crop Biotech Center. Niones, J.M. Philipp ines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Lapio, P.L.G. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. de Guzman, C.C., Ocampo, E.T.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Coron, Palawan (Philippines). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 28. 2019.*

Eggplant (Solanum melongena L.) is an economically important crop in the Philippines that is potentially exposed to drought and waterlogging. While several drought studies in eggplant have been reported, studies on eggplant under waterlogged conditions are limited. This study assessed the variations among eggplant genotypes for shoot and root traits grown under mild drought and waterlogging applied at the vegetative and reproductive stages. The experiments were set-up in the greenhouse using gravimetric approach in the application of terminal drought, 60% field capacity (FC), and waterlogged treatments. The treatments were laid-out in split-plot in RCBD with developmental stage as the main-plots. The study was conducted in 2017 to 2018 at the PhilRice Central Experiment Station, Maligaya, Science City of Muñoz, Nueva Ecija, Philippines.At the vegetative stage, larger change in plant height and smaller lateral roots were observed in terminal drought treated plants compared to the control. At the reproductive stage, a smaller difference in plant height and longer basal root length were observed in the terminal drought treated plants. Yield was maintained or even improved in some genotypes under drought stress at 60% FC compared to the well-watered control, indicating a potential to reduced water requirements for their productions. Under waterlogged treatment applied at both vegetative and reproductive stages, plants were significantly smaller change in plant height, and smaller leaf area, root length and root volume compared to the control. All traits were inhibited under waterlogged stress. Significant genotypic variations in yield were also observed under both drought and waterlogged treatments. Further studies will be done to quantify maximum rooting depth and density per depth in larger root boxes and increases intensity of drought stress conditions.

SOLANUM MELONGENA; GENOTYPES; DROUGHT; WATERLOGGING; AGRONOMIC CHARACTERS; ROOTS; SHOOTS

F40 - PLANT ECOLOGY

Ecology, ethnobotany, propagation and product development of Bago (Gnetum gnemon Linn.). **Garrigues, M.M. Surigao del Sur State. Univ., San Miguel, Surigao del Sur (Philippines). Garrigues, R.R. Upi Agricultural School, Upi, Maguindanao (Philippines). Coll. of Agriculture.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 33. 2019.*

Diversification of food base and utilization of wild edible plants constitute the backbone of resilience to the changing climate. This research evaluated the population status and ethnobotanical situation of G. gnemon in the wild, explored the different propagation techniques and reviewed novel foods from its leaves and seeds. Field observation, experimentation and modeling: field experiments and survey and hedonic testing were done to obtain data. Results showed that the population abundance of Bago in the wild was very rare and its age structure is irregular. Reasons for these were fortified from the ethnobotanical review results that 10% of the population from grassroots farmers uses Bago for food, medicine and construction and they sourced the plant only from the wild through unsustainable extraction coupled with its habitat destruction. Treatments for seed germination gave significant results on the development of feeders in 90 days but seedling emergence was not shortened. Promising shoots and callus development results on the two-nodal cuttings of matured green and young brown branch stages were observed even without the application of plant growth hormones in 90 days. Nutritional contents of Bago leaves and seeds powder have good and promising potentials for the development of functional foods that will help address common Filipino nutritional deficiencies. The feasibility of further processing of Bago products and their improvement is high and should be explored further.

GNETUM GNEMON; ECOLOGY; ETHNOBOTANY; PROPAGATION BY CUTTINGS; PRODUCT DEVELOPMENT

Geospatial mapping of the biodiversity and vegetation communities of Riparian plant species at the Binahaan River [Pastrana, Leyte, Philippines]. **Belax, D.A., Catenza, K.V.Q., Cabelin, K.J.C. Philippine Science High School-Eastern Visayas Campus, Pawing, Palo, Leyte (Philippines). Center for Research in Science and Technology.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the

Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 175. 2019.*

Riparian vegetation includes plant communities situated in streams, on river banks, and in floodplains; it is an indicator of a river's health. Disturbance affects riparian vegetation by altering the abundance and diversity of plant organisms. In this study, the diversity of riparian plant species of the Binahaan River in Pastrana, Leyte [Philippines] was assessed to show the status of the riparian area along one of the Leyte Metropolitan Water District's (LMWD) main water sources. To assess the diversity of riparian plant species, the transect method was used. A 5x5 m plot was established in every 200 m interval of transect. All plant organisms in the 5x5 m plot were recorded. After one 1 fieldwork, data on 4 sampling points along the river, with varying levels of disturbance, were collected. 31 genera were recorded, from which 28 have been identified. All genera were identified through morphological identification. The Shannon-Wiener Index shows values ranging from 1.431 to 2.255, with the highest observed in Point 3, followed by Point 1, then Point 2, and lowest in Point 4. Simpson's Diversity Index shows values ranging from 0.6808 to 0.8845 with the highest observed in Point 3, followed by Point 1, then Point 4, and lowest in Point 2, suggesting that Point 3 is the most diverse sampling point as it has the highest diversity level shown by both indices. Moreover, there are no endangered or vulnerable plant species observed in the study site. Overall, the results show a low to medium diversity of riparian plant species in the study area.

RIPARIAN VEGETATION; BIODIVERSITY; SPECIES; CARTOGRAPHY; SURVEYS; RIVERS; PHILIPPINES

Red list assessment of Philippine ironwood (Xanthostemon spp. Myrtaceae). **Malabrigo, P.L. Jr., Philippines Univ. Los Baños College, Laguna (Philippines). Dept. of Forest Biological Sciences. plmalabrigo@up.edu.ph., Gibe, R.C. Energy Development Corporation, Quezon City (Philippines).** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 30 (1) p. 1-21. 2020.*
https://erdb.denr.gov.ph/2020/09/08/sylvatrop-volume-30-no-1-january-to-june-2020/

The Philippines has 5 unique and endemic species of the genus Xanthostemon, collectively known as ironwood trees, listed in the Philippine Red List as either critically endangered or endangered. Exploration revealed several undocumented populations of ironwood species. Results of the inventory also showed extreme abundance and dominance of the species in their area of occurrence. Following the categories and criteria set by the International Union for Conservation of Nature (IUCN), X. bracteatus, X. philippinensis and X. verdugonianus were assessed as vulnerable (VU)), X. fruticosus was categorized as

endangered (EN) while X. speciosus was assessed as near threatened (NT). In addition, the paper presents an updated species profile for each ironwood species. The enormous number of new populations recorded revealed the lack of botanical explorations done in the past. Assessment of conservation status necessitates purposive survey of the species being assessed since most criteria cannot be reliably obtained unless plant inventory is conducted.

MYRTACEAE; SPECIES; ENDEMICS; TAXONOMY; PLANT ECOLOGY; ENDANGERED SPECIES; PHILIPPINES

F60 - PLANT PHYSIOLOGY AND BIOCHEMISTRY

Bioherbicidal activity of Medinilla magnifica Lindl. leaf extract. **Tinio, J.C.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. Rayos, A.L. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Aguila, M.J.B., Salamanez, K.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. kcsalamanez@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 270-275. 2019.*

The bioherbicidal activity of kapa-kapa (Medinilla magnifica Lindl.) was studied for the first time. Phenolics from its leaves were extracted with 7:7:6 methanol-acetone water (MAW). The phenolics of the crude extract were quantified using the Folin-Ciocalteu method and values of 71.86 mg Ga*/g extract for total phenolics and 29.58 mg QUE*/g extract for total flavonoids were obtained. The crude extract was subjected to acid hydrolysis and the bioherbicidal activity of the resulting hydrolysate was determined. Lettuce seed germination assay was done and the median lethal dose LD50 value shows that it has great potentials for use against weeds. The extract inhibited the growth of Echinochloa crus-galli, Cyperus iria, and Ludwigia hyssopofolia, with E. crus-galli showing the greatest sensitivity among the three species. Total chlorophyll content of soybean was reduced by the extract. This suggests that the acid-hydrolyzed extract of M. magnifica decreased chlorophyll production, resulting in reduced biomass of the test weeds.

ORNAMENTAL PLANTS; ECHINOCHLOA CRUS GALLI; WEEDS; INFLORESCENCES; INDIGENOUS ORGANISMS; WEED CONTROL; PHENOLIC COMPOUNDS; PLANT EXTRACTS; HERBICIDES; PESTICIDES; GERMINATION; SEEDS; LEAVES; PLANT EXTRACTS; PESTICIDAL PROPERTIES

Biomass and carbon accumulation potentials of mycorrhizal inoculated Acacia mangium and Eucalyptus urophylla seedlings in mined-out areas. **Aggangan, N.S. Philippines Univ. Los Baños College, Laguna (Philippines). National Inst. of Molecular Biology and**

Biotechnology. nellysaggangan@gmail.com., Racelis, E.L. Philippines Univ. Los Baños, College, Laguna (Philippines). Training for Center for Tropical Resources and Ecosystem Sustainability. Algrabre, I.A.C. Philippines Univ. Los Baños College, Laguna (Philippines). National Inst. of Molecular Biology and Biotechnology. *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 30 (1) p. 67-93. 2020.*
https://erdb.denr.gov.ph/2020/09/08/sylvatrop-volume-30-no-1-january-to-june-2020/

Bioremediation has a great potential in reducing environmental degradation. This is also a strategy used in mitigating climate change through carbon sequestration. This study assessed the biomass and carbon accumulation of Acacia mangium and Eucalyptus urophylla as influenced by commercial mycorrhizal inoculants. Seedlings were inoculated with mycorrhizal inoculants produced locally or obtained abroad, grown in a screen house for 6 months and planted in a mined-out area in Mogpog, Marinduque. The total plant biomass after 27 months in the field was computed using the allometric equation by Martinez-Yrizar et al. (1992). Results showed that A. mangium inoculated with Mycogroe (local inoculant) has the highest total biomass of 33.65 t ha-1 and CO2, of 55.52 t/ha. This is 121.46% increase relative to its control counterpart with biomass content of 15.19t/ha, C of 6.84 t/ha and CO2 of 25.07 t/ha. On the other hand, Mykos30 (abroad) inoculated E.urophylla has a biomass build-up of 11.05 t/ha, C and CO2 density of 4.97 t ha-1 and 18.23 t/ha, respectively. The uninoculated E. urophylla counterpart had a biomass density of 5.30 t/ha with 2.38 t/ha of C and 8.74 t/ha of CO2 stored. The value showed 108% increase in total biomass and stored carbon, relative to the uninoculated ones. These findings suggests that accumulation of biomass and the ability of trees to sequester atmospheric carbon in degraded areas are enhanced by mycorrhizal inoculation.

ACACIA MANGIUM; EUCALYPTUS UROPHYLLA; BIOFERTILIZERS; BIOMASS; CLIMATIC CHANGE; BIOREMEDIATION; SEED; INOCULATION

Diversity in Vitex negundo L.: morphological genetic, histochemical and molecular characterization. **Bautista, N.S. Philippines Univ. Los Banos, College, Laguna (Philippines). Plant Biology Div.** UPLB Centennial Professorial Chair Award AY 2019-20. College, Laguna (Philippines). 2020.

Lagundi (Vitex negundo L.) is one of the top ten medical plants being promoted by the Department of Health here in the Philippines. This lecture aims to elucidate the diversity in Vitex negundo L. in the Philippines through morphological, genetic, phytochemical and molecular characterization. It is an offshoot of the preliminary research done since 2010 that started on the genetic profiling of Lagundi using molecular biology markers, i.e. inter-sample sequence repeats (ISSR) to assess the genetic variations in V. negundo found in the

fifteen geographic locations in the Philippines. Morphologically, leaf characterization of ten V. negundo germplasm collections from National Plant Genetics Research Laboratory (NPGRL), Institute of Plant Breeding, UP Los Banos, Philippines based on several leaf characters, such leaf types, shape, margin, apex, base, adaxial and abaxial surfaces were characterized. Moreover, foliar trichome anatomy, micromorphology and histochemistry were also evaluated. Based on ISSR markers, there was a common locus or pattern of bands that is present in all samples from the fifteen geographic locations that can be attributed to the fact that all samples belong from the fifteen geographic locations that can be attributed to the fact that all samples belong to one species. The samples also exhibited a great number of polymorphisms suggesting genetic variation found within the V. negundo species that can be attributed to several factors like climate type, tapography and soil type. The leaf characters and their morphometric analysis have shown to be essential in elaborating the variations found in the ten germplasm collection where two groups have been formed, one with lanceolate leaves and the other a non-lanceolate leaf shape. Additional, intraspecific variations of foliar trichome morphology that can be classified into six morphotypes were found evident in the ten accessions used in the study. The presence of both grandular and non-gradular trichomes as well as their respective types in all accessions suggests that trichome type is a stable character wiyhi the V. negundo accessions. Moreover, foliar trichome histochemistry was carried out to detect the presence or absence of lipid, carbohydrates and secondary metabolites such as terpenes, phenolic compounds, flavonoids and alkaloids. It showed the qualitative variations in terms of contents and localization of the major chemical compounds among the tested V. negundo accessions and between the types of trichomes. The phytochemical variation among accessions of similar species is highly attributed to several factors ranging from genetic, biotic abiotic environmental factors influencing the amount of metabolites present in a plant species and evan in different plant parts. The results revealed from the aforementioned studies on genetic diversity, leaf characterization and morphometrics, and foliar trichome micromorphology and histochemistry provided baseline information an can be a helpful tool in resolving taxonomic discrepancies in V. negundo. It is evident that the phenolic pasticity in V. negundo is high due its adaptation to changes in the environment, thus, it is probable that the active compounds will be different in quantity and potency for each morphotypes/variants. with regard to the future directions for V. negundo research, the availability of a biorepository of medicinal plants is necessary. Biorespository collects, stores, stores, maintains, distributes biological materials of different forms and their associated information for use in future researches. Lagundi samples and other medicinal plants could be deposited in the forms of seeds, extracts, DNA or RNA, and even live plants with their corresponsing vital information. Furthermore, molecular and biotechnological approaches such DNA barcoding will help in the rapid and accurate species identification. Since medicinal plants, such as V. negundo contain numerous active ingredients and complex molecules that are yes to be identified and analyzed, OMIC technologies (i.e.

genomics, transcriptomics, preteomics, metabolics, phenomics) are promising and powerful tools that can be used in identyfing genes, proteins, metabolites, mechanics and physiological actions of medicinal plat species. Lastly, because there are also the threats or losing the vast potential sources of our medicinal plants worldwide due to increasing human population as well as as plant consumption. It is imperative to develop breeding strategies and methodologies concerning the conservation and sustainable usage of medicinal plant resources.

VITEX NEGUNDO; PLANT ANATOMY; MEDICINAL PROPERTIES; CHEMICOPHYSICAL PROPERTIES; DRUG PLANTS; GENETIC MARKERS; GENETIC VARIATION

Evaluation of the curative effect of Cymbopogen nordus (L.) Rendle essential oil on Fusarium wilt of abaca (Musa textilis Nee). **Gaña, R.R.B. rbgana1@up.edu.ph., Ata, J.P., Manalo, M.Ma.Q. Philippines Univ. Los Baños, College, Laguna (Philippines). Forest Biological Sciences.** *Ecosystem and Development Journal (Philippines). 2012-3612. v. 7 (1) p. 14-20. 2017.*

Abaca (Musa textilis), a native species in the Philippines, is a reforestation crop integrated in different agroforestry farming systems in the country. In this study, the effect of citronella (Cymbopogon nardus) essential oil was observed to inhibit mycelial growth of Fusarium oxysporum f.sp. cubense (E. F. Smith) W.C. Snyder and H.N. Hansen causing Fusarium wilt disease in abaca in vitro and its disease symptoms in vivo. Four different concentrations (0.001%, 0.025%, 0.05% and 0.1% v/v) were used for the in vitro assay within 21 days of observation. Mycelial growth was significantly inhibited in the 0.05% and 0.1% concentrations. For the in vivo assay, the 0.1% v/v concentration was used to test the efficacy of citronella essential oil in suppressing leaf symptoms of Fusarium wilt disease on Abaca seedlings using the Disease Severity Index (DSI). The Fusarium-inoculated seedlings with citronella essential oil had the highest DSI (2.8), followed by seedlings with inoculation but without essential oil (2.7), seedlings both without inoculation and essential oil (control) (1.6), and seedling without inoculation but with essential oil (1.13). Findings showed that citronella essential oil can lessen the occurrence of morphological symptoms such as leaf spots and anthracnose that are not visible symptoms of the Fusarium wilt disease.

CYMBOPOGON; SPECIES; ESSENTIAL OILS; MUSA TEXTILIS; FUSARIUM; WILTS

Formulation of larvicide from Capsicum frutescens (Linn.) fruit extract against Aedes aegypti (L.). **Soria, M.C., Argonza, F.G., Claros, C. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Coll. of Pharmacy. Quiming, N. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Coll. of Arts and Sciences. Alvarez, M.R.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. Balotro, B.**

Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Coll. of Pharmacy. babalotro@up.edu.ph. *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 207-213. 2020.*

The crude ethanolic extract of Capsicum frutescens fruit was used in the formulation of larvicidal granules. The extract was first for phytochemical content and larvicidal activity against Aedes aegypti. Five trial formulations were developed using different combinations of excipients identified to be compatible with the active extract. These formulations were evaluated using Quality by Testing (QbT) Method (organoleptic evaluation, moisture content, powder flow property, particle size distribution, dissolution in water and larvicidal bioactivity). The C. frutescens extract (500 ppm) killed 100% of the test larvae after 24 and 48 h. Phytochemical analysis revealed the presence of steroids, indoles, alkaloids, flavonoids, sugars, coumarins and anthraquinones. Among the formulations tested, formulation No.5 (25% extract, 59% lactose, 1% 5% PVP-ethanol solution, and 15% microcrystalline cellulose (MCC) was the most active, with LC50-24 h=108.68 ppm, LC90-24 h=233.44 ppm, LC50-48 h=102.68 ppm, and LC90-48 h=182.50 ppm. Larvicidal granules (Formulation No.5) against A. aegypti were developed. The granules were able to kill 100% of the test larvae after 24 and 48 h of exposure. In addition, the formulation passed all the quality control measurements (low moisture content, excellent powder flow, soluble in water, and 90% cumulative frequency within 0.420-0841 mm).

CAPSICUM FRUTESCENS; AEDES AEGYPTI; BIOCHEMISTRY; FORMULATIONS; INSECTICIDES; VECTORBORNE DISEASES; PEST CONTROL; FRUITS; PLANT EXTRACTS

Physico-biochemical and antioxidative responses of different salt-sensitive sunflower (Helianthus annuus L.) genotypes. **Hosain, M.S. Bangladesh Agricultural Research Inst., Gazipur 1701(Bangladesh). Central Lab. lslam, M.U. Bangladesh Agricultural Research Inst., Gazipur 1701 (Bangladesh). Oil Research Centre. Molla, M.R. Bangladesh Agricultural Research Institute, Gazipur 1701 (Bangladesh). Plant Genetic Resources Centre. Hassanuzzaman, M. Sher-e Bangla Agricultural Univ., Dhaka-1207 (Bangladesh). Dept. of Agronomy. Rohman, M. Bangladesh Agricultural Research Inst., Gazipur 1701 (Bangladesh). Molecular Breeding Lab. motiar_1@yahoo.com.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 256-274. 2020.*

Salinity is one of the important abiotic stresses affecting growth, photosynthesis, ion accumulation, and antioxidant defense systems in sunflower (Helianthus annuus L.). This study investigated the physio-biochemical and antioxidative responses in different salt-sensitive sunflower genotypes: GP-4030 and BARISurzumukhi 2 as newly identified tolerant genotypes, PS-2 as sensitive and Hysan 33 as standard tolerant. Salt stresses caused higher

reduction in relative water content (RWC), chlorophyll (Chl) content, K+ and K+/ Na+ ratio, photosynthetic rate (pN), transpiration rate (E), stomatal conductance (gs), and intercellular CO2 concentration rate (Ci) in salt-sensitive genotype. This genotype had higher NA+, superoxide (O2.-), hydrogen peroxide (H2O2), lipid peroxidation (MDA) and proline (Pro) content than the tolerant genotypes. The tolerant genotypes maintained higher Pro content than the salt-sensitive genotypes under salt stress. All the tolerant genotypes had higher increment of superoxide dismutase (SOD), catalase (CAT) and peroxidase (POD) activities under salinity (12 dS m-1) than the salt-sensitive genotype. Similarly, increment of ascorbate peroxidase (APX) and glutathione reductase (GR) activity was higher in the tolerant, genotypes, but glutathione peroxidase (GPX) activity was higher in salt-sensitive genotype. However, both monodehydroascorbate reductase (MDHAR) and dehydroascorbate reductase (DHAR) activities decreased with salinity level. Glutathione S-transferase (GST) activity increased in all the genotypes under salinity and was higher in the tolerant genotypes. Higher accumulation of Pro, along with improved physiological and biochemical parameters in the tolerant genotypes, can confer tolerance by reducing oxidative damage through up-regulating defense under salinity.

HELIANTHUS ANNUUS; GENOTYPES; PHOTOSYNTHESIS; ION EXCHANGE; SOIL SALINITY; ANTIOXIDANTS; OSMOTIC STRESS; STRESS; OXIDATION; RESISTANCE TO INJURIOUS FACTORS; GROWTH CONTROL; GROWTH FACTORS; BANGLADESH

Phytochemicals and antioxidant activity in the leaves and roots of selected cassava (Manihot esculenta Crantz) genotypes. **Sazon, L.A.R., Abustan, M.A.M., Mendoza, M.R.DR., del Rosario, E.E. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Plant Breeding.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 25-26. 2019.*

Cassava is one of the main agricultural crops in the Philippines. Its roots are the commonly utilized plant part, while the leaves are eaten as vegetable in some areas of the country. The study conducted during 2017-2018 cropping season at the Institute of Plant Breeding experimental field in Tranca, Bay, Laguna [Philippines] aimed to assess the total phenol, flavonoid, antioxidant activity (AOA), and toxic phytochemical hydrocyanic acid (HCN) in the leaves and roots of 16 cassava genotypes. The experiment was laid out in a randomized complete block design with three replications. Results revealed that total phenol (100.1 - 224. 4 mg GAE/g DW), flavonoid (8.34 - 26.7 mg CE/g DW), AOA (43.8 - 89.7%) and HCN (57.5 - 572.2 mg/kg FW) in the leaves were generally higher than in roots. The leaves of KU50 had the highest total phenol (224.4 mg GAE/g DW), flavonoid (26.66 mg CE/g DW), and AOA (89.7%), but had high HCN (233.1 mg/kg FW) among the genotypes. Although

CG02-05r-05 had lower phenol, flavonoid and AOA in the leaves relative to the other genotypes, its HCN level was near the FAO/WHO's recommended level for food. Total phenol (0.24 – 0.56 mg GAE/g DW) and flavonoid (0.046 -0.057 mg CE/g DW) in the roots were very low, while AOA (47.4 - 53.4%) was at par with the AOA in the leaves. Highest HCN in the roots was observed in KU50(255.8 mg/kg FW), while lowest in CG02-25-05 (26.9 mg/kg FW). Cassava genotypes containing low HCN can easily be considered as food, while those with high HCN can cause harm to humans and animals when not properly processed. Cassava roots are good sources of carbohydrates, and while the study showed that the roots are low in total phenol, flavonoid and antioxidant activity, its leaves can still be explored for their potential as source of beneficial phytochemicals.

MANIHOT ESCULENTA; CASSAVA; GENOTYPES; LEAVES; ROOTS; ANTIOXIDANTS; BIOCHEMISTRY

Sap production of nipa palm (Nypa fruiticans Wurm b.) as influenced by flower stalk maturity and number of fronds. **Ibisate, M.T., Lauron, M.R.B. Aklan State Univ., Banga, Aklan (Philippines). Dept of Plant Science. Mansayon, M.M. Aklan State Univ., Banga, Aklan P.O. Box 5601 (Philippines). Res earch and Development Services.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 29-30. 2019.*

The study was conducted to find out the sap production of nipa palm as affected by flower stalk maturity and number of fronds maintained at Brgy. [village] Calizo, Balete, Aklan [Philippines] from January to March 2019. The study was laid out in a Randomized Complete Block Design (RCBD) with three replications. Data were analyzed using the Analysis of Variance (ANOVA) in RCBD. Significant results were tested using Least Significant Difference (LSD) utilizing Sirichai Statistics 6.07. Results of the study showed that sap yield. Total Soluble Solids (TSS) and nipa sap pH were not significantly affected by the stages of inflorescence maturity. The nipa inflorescence that produces nipa sap were during the pre-anthesis (14.00 ml), immature(13.22 ml) and developed inflorescence (0.45 ml). The TSS of nipa sap ranged from11.92 'Brix (immature Brix (immature inflorescence) to 15.91 'Brix which was obtained from developed inflorescence. Asto the pH of nipa sap, ranging from 3.38 mole/L (DEI) to 3.84 mole/L (PAI) which is extremely acidic.Moreover, the mean volume of nipa sap was not affected by the fronds maintained. The volume of nipa sap ranged from 665.08 ml per flower stalk in 3 fronds maintained to 936 ml/flower stalk for 4 fronds maintained. Likewise, the TSS and pH of nipa sap was not affected by the number of fronds maintained.

NYPA FRUTICANS; SAP; PRODUCTION; INFLORESCENCES; MATURITY

Seeds of selected Philippine soybean genotypes differ significantly in total flavonoids, anthocyanin content, and antioxidant activity. **Esguerra, C.J. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Santos, M.M.L. mlsantos@up.edu .ph. Mateo, J.M.C., Enicola, E.E. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Ocampo, E.T.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 162-163. 2019.*

Aside from desirable agronomic traits, superior nutritional qualities are significant factors in selecting food crop accessions or varieties for breeding. Flavonoids and anthocyanin are secondary metabolites with antioxidant properties known to eliminate or prevent oxidative damage and free-radical formation, contributing significantly to the health of human and animal populations. Conducted in the Analytical Service Laboratory at the Institutes of Plant Breeding, 79 soybean genotypes were characterized: 67 from stable lines of the population IPB SY96-27-23, 11 germplasm accessions from National Plant Genetic Resources Laboratory (NPGRL), three from Institutes of Plant Breeding's Tiwala series, and one identified farmer's variety, Manchuria. This study was conducted from January to May 2019. Three accessions from NPGRL had black seeds, and these were assigned as the control group. Freshly harvested seeds of the 79 genotypes were used for the determinations. Total flavonoid content was measured using NaNO2 and AICI3 method, while the pH differential method was conducted to quantify the total anthocyanin content. Antioxidant activity was assessed using the DPPH assay, and the result expressed as average % Relative Scavenging Activity (% RSA). Analysis of Variance (ANOVA) showed that there were significant differences (at a=0.05) among the genotypes in each of the parameters. The genotypes were sorted in different group using Tukey's Honestly Significant Difference Post Hoc Test. The total flavonoid content test, which values that ranged from 0.02 g/100g to 0.62 g/100g, resulted in 15 groupings. While total anthocyanin content, with values 0 mg/100 g to 177.01 mg/100 g, had 33 groups. The antioxidant activity test, 11.03% to 29.40%, grouped the genotypes into 26. The data suggest that, over-all, the significant differences among the genotypes with respect to the anthocyanin and flavonoid contents, and total antioxidant activity, can be utilized in breeding for new varieties with high antioxidant content.

GLYCINE MAX; SOYBEANS; SEEDS; GENOTYPES; ANTIOXIDANTS; ANTHOCYANINS; FLAVONOIDS

Total flavonoid, total phenolic content and antioxidant activity of Erechtites valerianifolia herb extracts. **Puspaningtyas, A.R. Jember Univ. (Indonesia). Faculty of Pharmacy. aixrose_pee@yahoo.co.id., Sholikhah, E.N. Universitas Gadjah Mada (Indonesia). Faculty of Medicine, Public Health, and Nursing. Astuti, P., Riyanto, S. Universitas Gadjah Mada (Indonesia). Faculty of Pharmacy.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 126-131. 2020.*

Erechtite svalerianifolia (Link ex Wolf.) Less.ex DC. or 'Jonggolan' (Indonesian name), a member of the family Asteraceae, was collected from Meru Betiri Forest, Indonesia. This study investigated the antioxidant activity of E. valerianifolia and its total phenolic and total flavonoid content. Methanol, ethyl acetate, dichloromethane, and hexane extracts of E. valerianifoliaherbs were tested using 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radicals scavenging assay. Antioxidant activity was expressed in IC50 values of the n-hexane, dichlormethane, ethyl acetate and methanol extracts (367.8000 ppm, 139.5200 ppm, 911.0540 ppm, and 401.9530 ppm, respectively) with the best antioxidant activity observed in dichloromethane (DCM) extract. Total phenolic content (TPC) of the n-hexane, dichloromrethane, ethyl acetate and methanol extracts were 10.6400± 0.0338 mg GAE/g; 6.4500 ± 0.0000 mg GAE/g; 6.6900 ± 0.0323 mg GAE/g; and 3.2300 ± 0.0000 mg GAE/g, respectively (with gallic acid as reference). Total flavonoid content (TFC) of the n-hexane, dichlormethane, ethyl acetate and methanol extracts were 1.4000 ± 0.0784 mg QE/g; -2.3900 ± 0.0000 mf QE/g; 0.4400 ± 0.0000 mg QE/g, and 0.1100 mg QE/g, respectively (with quercetine as reference). Total flavonoid content of the n-hexane, dichloromethane, ethyl acetate and methanol extracts were 2.3700 ± 0.1180 mg RE/g; -2.7900 ± 0.0000 mg RE/g; 0.9100 ± 0.0000 mg RE/g and 0.2400 ± 0.0000 mg RE/g, respectively (with rutin as reference). The correlation between total phenolic/total flavonoid content and antioxidant test was less than 50%, indicating no direct/negative correlation between polyphenolic content of the extracts and antioxidant activity.

ASTERACEAE; SPECIES; DRUG PLANTS; ANTIOXIDANTS; FLAVONOIDS; PHENOLIC CONTENT; FREE RADICALS; CHEMICAL COMPOSITION

Visible and shortwave near-infrared spectroscopy for rapid sugarcane quality testing. **Rosales, J.H., Yaptenco, K.F. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Agricultural Engineering. Agoncillo, M.C.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural and Machinery Testing and Evaluation Center.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 23. 2019.*

Reliable in-field quality measurement techniques are needed in the sugarcane industry since conventional technologies employed for sugarcane quality assessment are mostly done in the laboratory, requiring complex sample preparation and testing procedures. Development of a rapid, non-destructive and efficient mode of measurement which can be performed directly on sugarcane stalk samples is highly desirable. In this study, the potential of visible (Vis) and shortwave near-infrared (NIR) spectroscopy coupled with chemometrics to measure sugarcane quality parameters like Brix and moisture content of different sugarcane high yielding varieties was investigated on October to December 2018 in the Agricultural and Bio-Process Division, College of Engineering and Agro-Industrial Technology, UPLB [University of the Philippines Los Baños]. Diffuse reflectance spectra of sugarcane stalks coming from top and bottom internode sections were acquired by direct skin scanning method using Vis-NIR and NIR spectrometers at a wavelength range of 400nm to 1000nm, and 900nm to 1700nm, respectively. Reference data of Brix and moisture content were measured using handheld refractometer and oven-drying, respectively. Multivariate analyses such as principal component analysis and partial least squares regression (PLSR) were employed to interpret and relate spectral and reference data; forming classification and prediction models. PLSR models derived from NIR spectra showed good performance in predicting Brix and moisture content, with coefficient of determination, R2=0.49 and R2=0.597, respectively. Whereas for Vis-NIR spectra, generated models have R2=0.49 and R2=0.50 in predicting Brix and moisture content, respectively. Higher prediction accuracy was achieved when NIR spectra were used. Results only proved that Vis-NIR spectroscopy is potentially useful for the rapid and non-destructive measurement of sugarcane quality.

SACCHARUM OFFICINARUM; VARIETIES; SUGARCANE; QUALITY; EVALUATION; CHEMICOPHYSICAL PROPERTIES; SPECTROMETRY

Water use and water efficiency of good eating quality Korean varieties under vegetative stage soil moisture deficits. **Cruz, A.S. ascruz@phirice.gov.ph., phascruz0726@gmail.com., Cabral, M.C.J., Niones, J.M., Suralta, R.R. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Rice Chemistry and Food Science Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no . 1) p. 161. 2019.*

In the Philippines, high yielding Korean rice varieties are being adopted because of their good eating qualities. The Philippines has drought-prone rainfed environments which demand breeding of genotypes with high yielding and drought tolerance ability. Dry matter production under drought is a product between water use (WU) and water use efficiency

(WUE). This study quantified the relationship between dry matter with WU and WUE among selected Korean rice varieties under drought. Five Korean varieties such Dasanbyeo, Gayabyeo, Hanareum2, Milyang 23 and Saegyejinmi together with IR64 were grown in rootbox for 40 days and subjected to two water treatments: continuously waterlogged (CWL) and progressive drought (PDR, 10% SMC). Under drought, Dasanbyeo showed the least reduction among genotypes at 22.93% in shoot dry weight (SDW). Total leaf area also showed similar pattern of response with that of SDW. Correlation analyses showed that the varietal differences in SDW under drought had negative relationship with WU but had positive relationship with WUE indicating that differences among Korean varieties in shoot dry matter production in response to drought was due to their genotypic differences in maintaining higher photosynthetic efficiencies under the condition. Our results validated our previous findings that higher dry matter production in Korean varieties tested was greatly contributed by their greater ability to maintain high WUE (shoot related trait) rather than WU (root related trait). Further studied are being conducted to further quantify and characterize their photosynthetic efficiencies under drought stress.

ORYZA SATIVA; VARIETIES; DROUGHT STRESS; WATER DEPRIVATION; SOIL WATER CONTENT; WATER USE; EFFICIENCY

F61 - PLANT PHYSIOLOGY - NUTRITION

Antioxidant enzyme activities and dry matter of rice plant as affected by interactions of lead, phosphorus and zinc. **Mardomi, S., Najafi, N. n-najafi@tabrizu.ac.ir., anajafi@yahoo.com., Reyhanitabar, A., Dehgan, G. University of Tabriz, Tabriz (Iran). Dept. of Soil Science.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 310-321. 2019.*

Nutrient management can be an effective approach to enhance plant antioxidant defense system under heavy metal toxicity. A greenhouse experiment was conducted to examine the effects of the two-and three-way interactions of lead (Pb), zinc (Zn) and phosphorus (P) on the activity of catalase (CAT), peroxidase (POD) and superoxide (SOD) enzymes and the total dry matter (TDM) of rice (Oryza sativa L. cv. Hashemi). This study was conducted as a factorial experiment in completely randomized design with three factors of Zn (0, 25 and 250 mg/kg), P (0, 50 and 500 mg/kg) and Pb (0, 200, 400 and 800 mg/kg) and three replications in calcareous soil. CAT, POD and SOD activity in the fresh leaves and TDM of the rice plant were determined. The effects of two-and three-way interactions of P, Pb and Zn on the antioxidant enzymes activities and TDM of rice plant were significant, and the type interaction was dependent on the levels of these factors. Soil Pb contamination significantly increased the CAT, POD and SOD enzyme activity but resulted in decreased TDM of the rice plant. Application of 250 mg Zn per kg of soil significantly increased activity of CAT and POD

enzymes and TDM at the Pb level of 800 mg/kg. Phosphorus fertilization significantly increased CAT and POD activity and TDM under Zn-and Pb-contaminated conditions. To increase antioxidant enzyme activity and rice tolerance and growth in Pb-contaminated calcareous soils, combined application pf P and Zn at 500 and 250 mg per kg of soil, respectively, can be recommended under similar conditions.

ORYZA SATIVA; METALLIC ELEMENTS; DRY MATTER CONTENT; PHYTOTOXICITY; PLANT NUTRITION; ANTIOXIDANTS; HEAVY METALS; LEAD; ZINC; PHOSPHORUS; PEROXIDASES; CATALASE; ENZYMES; POLLUTANTS

Effect of zinc chelate and sulfate on mineral content, antioxidant activity and grain yield of Vigna unguiculata L. **Estrada-Dominguez, V. Universidad Juarez Autonoma de Tabasco, Tabasco (Mexico). Division Academica de Ciencias Agropecuarias. Sanchez-Chavez, E. Centro de Investigacion en Alimentacion y Desarrollo A.C. Unidad Delicias, Delicias, Chihuahua (Mexico). de la Cruz Lazaro, E. Universidad Juarez Autonoma de Tabasco, Tabasco (Mexico). Division Academica de Ciencias Agropecuarias. efrain.delacruz@ujat.mx., eclazaro@hotmail.com., Marquez-Quiroz, C., Osorio-Osorio, R. Centro de Investigacion en Alimentacion y Desarrollo A.C. Unidad Delicias, Delicias, Chihuahua (Mexico).** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 47-54. 2020.*

The study evaluated the effect of applying different doses of zinc sulfate and zinc chelate on the mineral content, antioxidant activity, and yield of grains of cowpea bean (Vigna unguiculata L.). Doses of 7, 14, and 28 mM/L of zinc sulfate and chelate were assessed against a distilled water control. In the plants, the days to flowering as well as grain weight, number of pods, and number of grains per plant were recorded. Meanwhile, in the grains, antioxidant activity, phenols, phytic acid, and mineral content were determined. Results indicated that biofortification with 7 and 14 m/Ml of sulfate and zinc chelate increases earliness in flowering, the number of grains per plant, and the grain yield in addition to improving the mineral content of the grains. The highest antioxidant activity was found with the zinc chelate treatments. Phenol content increased with the zinc chelate and sulfate doses, while the phytic acid content decreased with respect to the control. Biofortification of cowpea beans with zinc chelate and sulfate at 28m/Ml induced the highest accumulation of Zn in cowpea seeds. It is thus feasible to implement a biofortification program with zinc in cowpea beans to increase the zinc content, the mineral content, antioxidant activity, and phenol content in the grains, as well as to decrease the phytic acid content.

VIGNA UNGUICULATA; COWPEAS; NUTRIENT IMPROVEMENT; NUTRITIVE VALUE; PHENOLIC COMPOUNDS; PHYTIC ACID; ZINC; ZINC SULPHATE; ANTIOXIDANTS; FOOD ENRICHMENT

Morphological characterization and identification of Pa'uohi'iaka (Jacquemontia sandwincensis A. Gray) accession for hanging basket use. **Antesco, D.K.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Baldos, O.C. University of Hawaii at Manoa, Honolulu, Hawaii (USA). Dept. of Tropical Plant and Social Sciences.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 35. 2019.*

Introduced ornamentals that become invasive have contributed to the decline of native plant species and native plant cover in Hawaii. To mitigate this problem state laws were legislated to actively promote the use of native Hawaii plants as alternative ornamentals. Identifying selections for various horticultural uses such as hanging baskets is required to increase use and variety of native plants. Pa'uohi'iaki (Jacquemontia sandwicensis A. Gray [Convolvulaceae] is an endemic coastal plant identified with potential use for hanging baskets. In the wild, morphological variation exists, but efforts to collect characterize and identify selections for hanging baskets have not been done. The objectives of this study were to: 1)characterize six accessions collected from the islands of Maui (Ahihi-Kinu, McGregor and Puhala Bay), Oahu (Lyon Arboretum and Shidler College) and Hawaii (South Point) and 2)identify accessions suitable for hanging basket use. Six sample plants from each accession were propagated and allowed to grow for three months under irrigated outdoor conditions. To encourage lateral branching, stems were pruned to inches from the base and allowed to re-grow for one month. Seventeen quantitative and qualitative morphological characters were recorded. Principal component analysis and cluster analysis were conducted to visualize genetic distance and relatedness of each accession and possesses a distinct set of morphological characters. Principal component analysis identified eight morphological characters that contributes to the variation of the six accessions. Cluster analysis revealed that six accessions fall into three groups. Length of internodes and number of lateral branches were the most important trait for selecting accessions for hanging baskets. Among the six accessions, Puhala Bay, Lyon Arboretum and South Point were identified as suitable for hanging basket use.

ORNAMENTAL PLANTS; INDIGENOUS ORGANISMS; GENETIC VARIATION; SELECTION; AGRONOMIC CHARACTERS

Synthesis and characterization of nano zinc oxide foliar fertilizer and its influence on yield and postharvest quality of tomato. **Ybañez, Q.E. qeybanez@up.edu.ph., Sanchez, P.B., Badayos, R.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural Systems Inst. Agravante, J.U. Philippines Univ. Los Baños, College, Laguna (Philippines).**

Postharvest Horticulture Training and Research Center. *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 55-65. 2020.*

Nanoparticles of ZnO were synthesized via an alkaline precipitation technique that is ideal for large-scale and cost-effective production, using ZnSO4 and ZnCI2as starting materials. Scanning electron microscopy (SEM) analysis revealed that rod-shaped ZnO crystals with nanoscale dimensions were produced from both precursors, but ZnCI2 produced smaller and less aggregated crystals compared to ZnSO4as starting material, we refined the synthesis parameters by varying the solution pH and temperature, drying and calcination temperature, and adding cationic surfactant. Scanning electron microscopy – energy dispersive xray spectroscopy (SEM-EDS) analysis verified the nano size of ZnO (average of 45 nm via SEM), with low degree of aggression, and high chemical purity (59.96% Zn via EDS). X-ray diffraction (XRD) patterns identified hexagonal wurtzite structure with high crystallinity. Mineralogical analysis by X-ray fluorescence (XRF) showed that the nano ZnO were free impurities (90.39% ZnO) while FTIR analysis authenticated the presence of Zn and O bonds. There was sufficient evidence to conclude that nano ZnO with high chemical purity, and suitable characteristics as Zn foliar fertilizer source, was successfully synthesized using ZnCI2as starting material. The synthesized nano ZnO (SNZ) was tested as foliar fertilizer on pot-grown 'Marimar' F1 tomato, and compared with bulk ZnO (BZ), commercial nanoZnO (CNZ), and granular zinc sulfate (ZS). Boric acid was incorporated to a separate set of the Zn foliar treatments (SNZ+B, BZ+B, CNZ+B, ZS+B) to determine the synergistic effects of Zn and B on the growth and yield of tomato. SNZ+B resulted in positive responses in Zn and B uptake and dry matter yield. Marketable yield was found to be significantly highest in SNZ+B. Statistically, SNZ+B was either better than or equal to the SNZ and CNZ+B treatments in terms of the growth and yield parameters. SNZ+B also led to significant improvements in fruit quality, including higher TSS, %TA, and ascorbic acid content. SNZ enhanced the agronomic effectiveness of Zn foliar fertilizers as evident in the improvements in yield components of tomato. Nano-scaling made ZnO more available to stomates, making nutrient use more efficient .It also resulted in increased number of particles per unit weight of applied Zn, while increasing the specific surface area and solubility of ZnO in water, thus enhancing plant uptake which ultimately led to improvements on yield as well as postharvest quality.

TOMATOES; FOLIAR APPLICATION; FERTILIZER APPLICATION; PLANT NUTRITION; ZINC

Vegetative growth and nutrient use efficiency of tissue-cultured 'Saba' banana (Musa) plantlets in response to fertigroe sup R N,P, and K nanofertilizers. **Angeles, D.E., Ruzgal, J.J.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. jcruzgal@up.edu.ph., Caballero, G.L., Crodua, A.P. Davao del Sur State Coll., Davao del Sur**

(Philippines). Dept. of Agroforetry. *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 102-111. 2020.*

The study determined the effect of using FertiGroe sup R Nano N (18-0-0), Nano P (0-18-0), and Nano K (0-0-38) nanofertilizers on the growth and nutrient use efficiency of tissue-cultured 'Saba' banana (Musa ABB) plantlets. For 7 wk, conventional fertilizers (CF) and FertiGroe sup R nanofertilizers (NF) were applied to the plantlets at graduated level of the recommended rate (RR). Vegetative growth was monitored weekly. At the end of the experiment, samples were collected for dry matter partitioning and leaf issue analysis. Fertilizer treatment significantly improved pseudostem growth and dry matter production of 'Saba' banana plantlets. Plantlets applied with neither conventional fertilizer (CF) nor nanofertilizer NF (control) produced significantly shorter and thinner pseudostem, and less dry matter compared to plantlets that were applied with NF or CF, regardless of the recommended rate (RR) used. Despite having significantly shorter and thinner pseudostem, plantlets applied with NF at 50% RR and 75% RR produced dry matter comparable to plantlets applied with CF at 75% RR and 100% RR by allocating more dry matter to the leaves. Foliar P concentration was not limiting to the plants and its nutrient concentration in the leaves did not vary significantly across the treatments. N uptake was highest in plantlets applied with NF at 75% RR (0.187 g) and CF at 75% RR (0.158 g), 100% RR (0.167) and 125% RR (0.173 g). K uptake was highest in plantlets that received NF at 50% RR (0.355 g) and 75% RR (0.358 g) and CF at 75% RR (0.353 g). Nutrient use efficiency of the plantlets was measured using apparent nutrient recovery. Apparent potassium recovery of the plantlets applied with NF was higher compared to that of plantlets applied with CF. The computed optimum RR for FertiGroe sup R N nanofertilizer was 23.5% lower than the computed optimum RR for CF. FertiGroe sup R N nannofertilizer can also increase apparent nitrogen recovery by 36.87% compared to CF.

MUSA (BANANAS); VARIETIES; NUTRITIVE VALUE; SLOW RELEASE FERTILIZERS; FORMULATIONS; CONTROLLED RELEASE; SEEDLINGS; FERTILIZER APPLICATION

F62 - PLANT PHYSIOLOGY - GROWTH AND DEVELOPMENT

Glycerophosphodiester phosphodiesterase OsGdPDs sub 12.1 increases rice spikelet fertility by influencing stigma morphology during reproductive drought stress. **Oane, R.H., Enriquez, B., Macovei, A. International Rice Research Inst., Los, Baños, Laguna (Philippines). Plant Molecular Bilogy Lab. Trijatmiko, K.R. International Rice Research Inst., College, Laguna (Philippines). Genetic Transformation Lab. Chadra-Mohanty, P., Slamet-Loedin, I. Philippines Univ. Los Baños, College, Laguna (Philippines). Merca, F.E. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. Sese, M.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Mendoza, E.M.T.**

Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Kohli, J. International Rice Research Inst., Los, Baños, Laguna (Philippines). Plant Molecular Bilogy Lab. 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 7. 2019.*

Glycerophosphodiester phosphodiesterases (GDPD) are a family of enzymes that hydrolyze glycerophosphodiesters into sn-glycerol 3P and its respective alcohols. They are well studied in bacteria, fungi, mice, and humans but poorly characterized in plants. Glycerophosphodiester phosphodiesterase. OsGdPd12.1 is one of the putative candidate genes in qDTY 12.1, a QTL responsible for increased grain yield under severe reproductive-stage drought stress (DS). This is the first study characterizing this gene and its relation to grain yield under drought condition. To achieve this goal, authors used bioinformatics, molecular biology, physiology, confocal microscopy, and biochemical assay. The initial phase of this study involved transcript profiling of 13 rice GDPDs in IR64, Way Rarem, Vandana and 4818. Results showed that most rice GDPDs have overlapping and unique expression patterns in different issues and at different developmental stages. However, OsGdPd12.1 is unique. It was primarily expressed at the reproductive stage, in specific flower parts, with the highest expression in the stigma. Phenotypic characterization of the original parental genotype revealed that Way Rarem, the donor of the QTL contributed to the stigma phenotype of 481-B (Vandana with qDTY12.1 segment from Way Rarem Analysis of IR64 transgenic rice overexpression OsGdPd12.1 (OsGdPd12.1 Ox) resulted in increased stigma length, angle of stigma spread and exsertion rate. These were all positively correlated with spikelet fertility. Under DS conditions, overexpression of this gene alone increased grain yield by 36-69% over IR64 control. This is the first candidate gene in qDTY12.1 which found to be associated with increase in grain yield under drought. Biochemical assay showed that glycerol 3-P, the main by-product of GDPD action, was 33-58% higher in 481B compared with Vandana, similar to what was found in OsGdPd12.1 Ox (25-38% higher) compared with IR64 control. All these data strongly suggest that OsGdPd 12 1 may play role in spikelet fertility by mediating in stigma morphophysiology.

ORYZA SATIVA; RICE; GRAIN; CROP YIELD; SPIKELETS; GYNOECIUM; DROUGHT; STRESS

'Kasalath' allele in Nipponbare background is responsible for the plasticity in lateral root development of rice under soil moisture fluctuation stress. **Niones, J.M. Philippine Rice Research Inst., Maligaya Science City of Muñoz, 3119, Nueva Ecija (Phillipines). Genetic Resource Div. Suralta, R.R. Philippine Rice Research Inst., Maligaya Science City of Muñoz, 3119, Nueva Ecija (Phillipines). Crop Biotechnology Center. Inukai, Y., Kano-Nakata, M., Yamauchi, A. Nagoya Univ., Chikusa, Nagoya 464-8601 (Japan). Graduate School of**

Biographical Sciences. ayama@agr.nagoya-u.ac.jp., rrsmfs@yahoo.com. *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 188-198. 2019.*

Soil moisture fluctuations (SMF) from wet to dry and vice-versa are common under field conditions, which influence root growth and functions and thus dry matter production and yield. In such condition, phenotypic plasticity in L-type lateral root (LLR) development is an adaptive mechanism of rice and the associated quantitative trait locus (QTL) was previously detected in chromosome 12, mainly contributed by the 'Kasalath' allele in Nipponbare x Kasalath chromosome segment substitution lines (CSSLs). In this study, we used +qLLRN-12 genotype of Nipponbare background was used to validate the functions for LR plasticity under SMF and progressive drought. Plants were subjected to well-watered, fluctuations soil moisture and progressive drought conditions for 38 d. There were no significant genotypic differences in shoot growth and root development under well-watered condition. On the other hand, +qLLRN-12 genotype showed greater shoot dry weight by 31% than Nipponbare, which was associated with larger root system of the former than the latter genotype under fluctuating soil moistures. The greater root system development of +qLLRN-12 genotype was attributed to the greater L-type LR development by 95% relative to Nipponbare. However, under progressive drought condition, +qLLRN-12 genotype had reduced shoot dry weight (SDW) due to its smaller root system relative to its fluctuating soil moisture and well-watered counterparts. These results indicate that the introgressed segment of Kasalath on the chromosome 12 region of Nipponbare was responsible for the plasticity in L-type LR, which contributed to greater root system development, increased water uptake and consequently increased dry matter production under fluctuating soil moisture conditions. The findings also suggest that the expression of this allele is unique and triggered only under fluctuating moisture stress conditions.

ORYZA SATIVA; CHROMOSOMES; GENOTYPES; ROOTS; ROOT SYSTEMS; QUANTITATIVE TRAIT LOCI; SOIL WATER CONTENT; SOIL WATER RETENTION; SOIL WATER DEFICIT; RHEOLOGICAL PROPERTIES

Morpho-anatomical investigation on the adventitious rooting of hard-to-root Excelsa coffee (Coffea excelsa A. Chev.) stem cutting. **Opeña, J.M. Don Mariano Marcos Memorial State Univ.--North La Union Campus, Sapilang, Bacnotan, La Union (Philippines). Crop Science Dept. Sotto, R.C. Philippines Univ . Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Salazar, D.M., Protacio, C.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 32. 2019.*

Excelsa coffee (Coffea excelsa A. Chev.) species is known to be hard-to-root when propagated through stem cuttings. This study sought to examine the morpho-anatomical differences between Excelsa and Robusta coffee stem cuttings in order to identify any physical hindrances to rooting. Rooting of single node orthotropic Excelsa coffee stem cuttings from water sprouts with and without incisions at the rooting zone applied with auxin plus ferulic acid takes 5-7 months under mist. Morpho-anatomical examinations revealed that Excelsa coffee has thicker stem structures as compared to Robusta coffee. However, the most probable anatomical difference why Excelsa coffee is harder to root when compared to Robusta coffee is its narrow, compact and clustered nearly continuous layer of sclerenchymatic band as opposed to the discontinuous layer in Robusta coffee and due to the delayed root initial development in Excelsa coffee. Formation of adventitious roots could be associated with differentiation of the parenchyma cells and is believed to originate in the secondary xylem-vascular cambium region.

COFFEA EXCELSA; ROOTS; ROOTING; CUTTINGS; PLANT ANATOMY

Plasticity in nodal root hardpan penetration, deep soil water uptake, and shoot dry matter production under soil moisture fluctuations using chromosome segment substitution lines of rice. **Nguyen, D.T., Suralta, R.R., Kano-Nakata, M., Mitsuya, S., Owusu-Nketia, S., Yamauchi, A. Nagoya Univ., Nagoya 464-8061 (Japan). International Cooperation Center for Agricultural Education.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 214-234. 2020.*

Rainfed lowland (RFL) fields generally experience soil moisture fluctuations (SMF) and have a hardpan layer that impedes deep rooting during episodes of drought. The development of root systems in response to SMF and the ability of roots to elongate through the hardpan when it becomes relatively soft during re-watering are key rice traits to efficiently extract water at the deep soil during subsequent periods of drought. Thus, this study aimed to identify their chromosome segment substitution lines (CSSLs) from Sasanishiki and Habataki crosses, which have root plasticity exhibited in response to SMF, which enables plants to penerate the hardpan and develop deep root systems. Root plasticity was evaluated by comparing root traits between each of the 39 CSSLs and their recurrent parent, Sasanishiki, under water-stressed and well-watered 9WW control) conditions in hydroponics and soil-filled pots. Among the 39 CSSLs. three (SL34, SL35 and SL39) had similar growth as Sasanishiki under WW, but were able to produce greater shoot dry weight than their recurrent parent under transient soil moisture stress in hydroponics and soil culture. Under SMF, in the rootbox-pinboard and rootbox-hardpan systems, only SL39 showed a significantly greater root system development than Sasanishiki, SL39 also had a more enhanced root aerenchyma formation than Sasanishiki in the shallow layer during drought-

rewatered conditions under SMF, possibility facilitating atmospheric O2 diffusion to the root tips. As a consequence, SL39 promoted nodal root elongation through the hardpan during rewatering and subsequent greater deep root system development to access more water from the deep soil during the drought period of SMF, relative to Sasanishiki. The results implied that SL39 can be a good genetic material to study the QTL associated with plasticity in root hardpan penetration and deep root system development in rice.

ORYZA SATIVA; RICE; ROOT SYSTEMS; ROOTING; SOIL WATER CONTENT; FLOODED RICE; UPLAND RICE; FIELDS; QUANTITATIVE TRAIT LOCI; RHEOLOGICAL PROPERTIES; DRY MATTER CONTENT; HYDROPONICS; DROUGHT RESISTANCE; SOIL; DROUGHT

F63 - PLANT PHYSIOLOGY - REPRODUCTION

Glycerophosphodiester phosphodiesterase OsGdPDs sub 12.1 increases rice spikelet fertility by influencing stigma morphology during reproductive drought stress. **Oane, R.H., Enriquez, B., Macovei, A. International Rice Research Inst., Los, Baños, Laguna (Philippines). Plant Molecular Bilogy Lab. Trijatmiko, K.R. International Rice Research Inst., College, Laguna (Philippines). Genetic Transformation Lab. Chadra-Mohanty, P., Slamet-Loedin, I. Philippines Univ. Los Baños, College, Laguna (Philippines). Merca, F.E. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. Sese, M.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Mendoza, E.M.T. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Kohli, J. International Rice Research Inst., Los, Baños, Laguna (Philippines). Plant Molecular Bilogy Lab.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 7. 2019.*

Glycerophosphodiester phosphodiesterases (GDPD) are a family of enzymes that hydrolyze glycerophosphodiesters into sn-glycerol 3P and its respective alcohols. They are well studied in bacteria, fungi, mice, and humans but poorly characterized in plants. Glycerophosphodiester phosphodiesterase. OsGdPd12.1 is one of the putative candidate genes in qDTY 12.1, a QTL responsible for increased grain yield under severe reproductive-stage drought stress (DS). This is the first study characterizing this gene and its relation to grain yield under drought condition. To achieve this goal, authors used bioinformatics, molecular biology, physiology, confocal microscopy, and biochemical assay. The initial phase of this study involved transcript profiling of 13 rice GDPDs in IR64, Way Rarem, Vandana and 4818. Results showed that most rice GDPDs have overlapping and unique expression patterns in different issues and at different developmental stages. However, OsGdPd12.1 is unique. It was primarily expressed at the reproductive stage, in specific

flower parts, with the highest expression in the stigma. Phenotypic characterization of the original parental genotype revealed that Way Rarem, the donor of the QTL contributed to the stigma phenotype of 481-B (Vandana with qDTY12.1 segment from Way Rarem Analysis of IR64 transgenic rice overexpression OsGdPd12.1 (OsGdPd12.1 Ox) resulted in increased stigma length, angle of stigma spread and exsertion rate. These were all positively correlated with spikelet fertility. Under DS conditions, overexpression of this gene alone increased grain yield by 36-69% over IR64 control. This is the first candidate gene in qDTY12.1 which found to be associated with increase in grain yield under drought. Biochemical assay showed that glycerol 3-P, the main by-product of GDPD action, was 33-58% higher in 481B compared with Vandana, similar to what was found in OsGdPd12.1 Ox (25-38% higher) compared with IR64 control. All these data strongly suggest that OsGdPd 12 1 may play role in spikelet fertility by mediating in stigma morphophysiology.

ORYZA SATIVA; RICE; GRAIN; CROP YIELD; SPIKELETS; GYNOECIUM; DROUGHT; STRESS

F70 - PLANT TAXONOMY AND GEOGRAPHY

Diversity assessment of the riparian vegetation along the Binahaan River, Leyte [Philippines]. **Belas, D.A. Philippine Science High School-Eastern Visayas Campus, Pawing, Palo, Leyte (Philippines). Villarta, N.M., Gutierrez, N.A.E. Philippine Science High School-Eastern Visayas Campus, Pawing, Palo, Leyte (Philippines). Center for Research in Science and Technology.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 169. 2019.*

Riparian vegetation commonly serves as an indicator of a river's health; it includes plant communities situated in streams, on river banks, and in floodplains. It also serves as the last line of defense that prevents contaminants from entering the river and acts as a setting for many ecosystem functions. The Binahaan River plays a major economic role as one of the sources of potable water for distribution of the Leyte Metropolitan Water District, but there is insufficient knowledge on the floral diversity of the river. Thus an assessment of the riparian floral diversity was conducted to obtain baseline data. An interrupted transect belt method was used where 5x5m quadrats were established in every 200m interval of the transect. 4 quadrats with differing vegetation covers were identified and were used as sampling points. All plants in the quadrats were recorded and the floral diversity was then computed based on this data. Identification through morphological characteristics revealed that 19 species of plants were found along the sampling points of the Binahaan River. Mimosa pudica was observed in all sampling points, and Wedelia chinensis was the most dominant species. The Shannon-Wiener Diversity Index values ranged from 1.134 to 1.882,

with the highest observed in Point 3 and lowest in Point 4. Simpson's Diversity Index shows values ranging from 0.6281 to 0.8352 with the highest observed in Point 3 and lowest in Point 2. Data suggests that Point 3 is the most diverse sampling point as it has the highest diversity level shown by both indices.

RIPARIAN VEGETATION; RIPARIAN ZONES; RIVERS; BIODIVERSITY; FLORA; PHILIPPINES

Red list assessment of Philippine ironwood (Xanthostemon spp. Myrtaceae). **Malabrigo, P.L. Jr., Philippines Univ. Los Baños College, Laguna (Philippines). Dept. of Forest Biological Sciences. plmalabrigo@up.edu.ph., Gibe, R.C. Energy Development Corporation, Quezon City (Philippines).** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 30 (1) p. 1-21. 2020.*
https://erdb.denr.gov.ph/2020/09/08/sylvatrop-volume-30-no-1-january-to-june-2020/

The Philippines has 5 unique and endemic species of the genus Xanthostemon, collectively known as ironwood trees, listed in the Philippine Red List as either critically endangered or endangered. Exploration revealed several undocumented populations of ironwood species. Results of the inventory also showed extreme abundance and dominance of the species in their area of occurrence. Following the categories and criteria set by the International Union for Conservation of Nature (IUCN), X. bracteatus, X. philippinensis and X. verdugonianus were assessed as vulnerable (VU)), X. fruticosus was categorized as endangered (EN) while X. speciosus was assessed as near threatened (NT). In addition, the paper presents an updated species profile for each ironwood species. The enormous number of new populations recorded revealed the lack of botanical explorations done in the past. Assessment of conservation status necessitates purposive survey of the species being assessed since most criteria cannot be reliably obtained unless plant inventory is conducted.

MYRTACEAE; SPECIES; ENDEMICS; TAXONOMY; PLANT ECOLOGY; ENDANGERED SPECIES; PHILIPPINES

H - PLANT PROTECTION

H10 - PESTS OF PLANTS

Comparative life history, fecundity, and survival of Spodoptera exigua (Hubner) (Lepidoptera:Noctuidae) on Allium cepa L. and other host plants in the Philippines. **Navasero, M.M. cely_navasero@yahoo.com.ph., Navasero, M.V., Candano, R.N., De Panis, W.N. Philippines Univ. Los Baños, College, Laguna (Philippines). National Crop**

Protection Center. *Philippine Entomologist (Philippines). 0048-3753. v. 33 (1) p. 75-86. 2019.*

The life history, development, and post development traits of Spodoptera exigua (Hübner) were studied on different host plants (Allium cepa L., A. Fistulosum L., Ricinus communis L., Trianthema portulacastrum L., and Zea mays L.) in the laboratory. Significant differences were observed in the life history, larval development, total development time, post developmental period, and fecundity among the host plants tested for both sexes of S. Exigua. Suitability for feeding and development in decreasing order are as follows: T. Portulacastrum, R. Communis, A. Fistulosum, A. Cepa, and Z. mays. based on proximate analysis, levels of crude fiber and percent moisture rather than crude protein, crude fat, and total sugar of host plants had influence on feeding suitability and development for S. exigua.

ALLIUM CEPA; ALLIUM FISTULOSUM; RICINUS COMMUNIS; ONIONS; ZEA MAYS; SPODOPTERA EXIGUA; LEAF EATING INSECTS; INSECTA; PESTS OF PLANTS; HOST PLANTS; LARVAE; LIFE CYCLE; INSECT CONTROL; FERTILITY; PHILIPPINES

Documented pupal eye color of the West Indian fruit fly, Anastrepha obliqua (Maquart), as a tool for radiation sterilization. **Resilva, S.S. Philippine Nuclear Inst., Commonwealth Ave., Diliman, Quezon City (Philippines). Agricultural Research Section. ssresilva@yahoo.com. Hernandez, E. Subdireccion de Desarollo de Metodos, Programa Mosafrut, Camino a los Cacahotales s/n, 30860 Metapa de Dominguez, Chiapas (Mexico). Obra, G.B. Philippine Nuclear Inst., Commonwealth Ave., Diliman, Quezon City (Philippines). Agricultural Research Section.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 247-254. 2019.*

Pupal age is critical when sterilizing fruit fly pupae for field releases in the sterile insect technique (SIT) programme. When kept at 26 deg C, pupae of the West Indian fruit fly, Anastrepha obliqua (Maquart), are irradiated after 12-13 d or 22 d before emergence. At this age, pupal eye color, which is used to determine the optimum stage, is very dark brown and grayish green as classified based on the Munsell sup R Soil Color Charts. However, it is often necessary to use different pupal holding temperatures in order to manipulate pupal development, especially when unforeseen problems occur during the rearing procedure for A. obliqua. Holding pupae at lower temperatures delays pupal development and slows down the progression of eye color changes, but at higher temperatures, the opposite occurs. The pupal eye color of the fruit fly was documented at different ages at different holding temperatures. Using this eye color as the reference guide for timing the irradiation of pupae, the optimum pupal age for irradiation when held at 15, 19, 28 deg C and natural environment (24-34 deg C) was 35-39, 28-30, 11 and 12-13 d old, respectively. The results indicate that for the A. obliqua used for SIT programs anywhere in the word, pupae

destined for radiation sterilization can be maintained at holding temperatures between 15 deg C and 28 deg C without affecting their development. Pupal eye colors identified in each holding temperature can be used as baseline information in the mass rearing facility to judge the optimum time for radiation sterilization of pupae kept at the required holding temperature to accelerate or delay pupal development. Pupal eye color is a very useful tool to avoid or solve potential problems that may be encountered in mass rearing operations in the SIT release program.

ANASTREPHA; TEPHRITIDAE; FRUIT DAMAGING INSECTS; PESTS OF PLANTS; INSECT CONTROL; STERILIZATION; STERILIZING; BIOLOGICAL CONTROL; DOCUMENTATION; ANIMAL DEVELOPMENTAL STAGES; RADIATION; MASS REARING

Effect of entomopathogenic fungus Metarhizium (Nomuraea rileyi (Farl.) samson on the third instar larvae of the onion armyworm, Spodoptera exigua Hubner (Lepidoptera: Noctuidae) under laboratory conditions. **Montecalvo, M.P. mpmontecalvo@up.edu.ph., Navasero, M.M. Philippines Univ. Los Baños, College, Laguna (Philippines). National Crop Protection Center.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 140-145. 2020.*

The armyworm, Spodoptera exigua Hubner (Lepidoptera: Noctuidae), caused severe destruction in the production of onion and other crops in the Philippines. This study examined the virulence of an entomopathogenic fungus against this insect pest. Metarhizium (Normuraea) was successfully isolated from mummified larvae of S. exigua. In a laboratory bioassay, third larval instars were exposed to conidial concentrations of M. rileyi by mist spraying. The fungus was highly pathogenic to S. exigua, which caused infection starting 2 d after treatment. More than 50% of the larvae succumbed to infection 6 d after treatment M. rileyi at 1 x 10 sup 7 and 1 x 10 sup 8 conidia/mL caused 100% mortality 7 d after treatment. Conidial concentrations caused 73-100% mortality 10 d after treatment with mean lethal time of 4.17-7.83 d. Calculated median lethal dose (LD50) from 7-10 d after treatment was 1.49 x 106 to 9.57 x 10 sup 4 conidia/mL. High epizootics due M. rileyi resulted in low pupation rate (<20%) and adult emergence (3%). Larval duration, pupal size, and weight did not vary significantly. Our findings suggest the virulence of M. rileyi againstS. exigua, which must be further evaluated to determine its potential as biocontrol agent and as an alternative management option to chemical pesticides.

SPODOPTERA EXIGUA; NOMURAEA; PESTS OF PLANTS; ENTOMOGENOUS FUNGI; METARHIZIUM; BIOLOGICAL CONTROL AGENTS; INSECT CONTROL

Evaluation of leafhopper performance in eggplant using image processing techniques. **Magnaye, A.V. avmagnaye@up.edu.ph., Madrid, V.R.M. Philippines Univ. Los Baños,**

College, Laguna (Philippines). Inst. of Computer Science. vmmadrid@up.edu.ph., Taylo, L.D. ldtaylo@up.edu.ph., Cainday, J.T. jtainday@up.edu.ph., Hautea, D.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. dmhautea@up.edu.ph. 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 173-174. 2019.*

Feeding damage of leafhopper, Amrasca biguttula (Ishida) poses a threat in eggplant production as early as one month after transplanting. Yield loss due to feeding damage can reach 50% at high infestation rate. Leafhopper is a phloem sap feeder causing yellowing of leaf margin, drying-up of leaves, resulting to hopperburn condition that may lead to stunted plant growth. Monitoring of feeding damage among eggplant germplasm to identify the individual plants with resistance to the leafhopper was usually done on a weekly basis. The procedure required counting the leafhoppers per 3leaf samples of 5 plants and damage scoring the plant. An innovation was done to screen eggplant entries by automatically taking photos, recording, and counting the leafhoppers that alighted on the leaves. This study used cameras, such as network/IP/USB webcams, that are controlled by a computer. This study designed an image capture setup (with the camera placed at the base of the plant) and developed a computer program that would connect to the camera and automate the counting of leafhoppers. The image processing techniques used are image contrast enhancement to isolate the leafhoppers from the leaves and binarize the image using adaptive threshold to extract and count the leafhoppers present.

SOLANUM MELONGENA; AUBERGINES; CROP LOSSES; AMRASCA BIGUTTULA; FEEDING PREFERENCES; EVALUATION; IMAGE PROCESSING; IMAGERY

Formulation of larvicide from Capsicum frutescens (Linn.) fruit extract against Aedes aegypti (L.). **Soria, M.C., Argonza, F.G., Claros, C. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Coll. of Pharmacy. Quiming, N. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Coll. of Arts and Sciences. Alvarez, M.R.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. Balotro, B. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Coll. of Pharmacy. babalotro@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 207-213. 2020.*

The crude ethanolic extract of Capsicum frutescens fruit was used in the formulation of larvicidal granules. The extract was first for phytochemical content and larvicidal activity against Aedes aegypti. Five trial formulations were developed using different combinations of excipients identified to be compatible with the active extract. These formulations were

evaluated using Quality by Testing (QbT) Method (organoleptic evaluation, moisture content, powder flow property, particle size distribution, dissolution in water and larvicidal bioactivity). The C. frutescens extract (500 ppm) killed 100% of the test larvae after 24 and 48 h. Phytochemical analysis revealed the presence of steroids, indoles, alkaloids, flavonoids, sugars, coumarins and anthraquinones. Among the formulations tested, formulation No.5 (25% extract, 59% lactose, 1% 5% PVP-ethanol solution, and 15% microcrystalline cellulose (MCC) was the most active, with LC50-24 h=108.68 ppm, LC90-24 h=233.44 ppm, LC50-48 h=102.68 ppm, and LC90-48 h=182.50 ppm. Larvicidal granules (Formulation No.5) against A. aegypti were developed. The granules were able to kill 100% of the test larvae after 24 and 48 h of exposure. In addition, the formulation passed all the quality control measurements (low moisture content, excellent powder flow, soluble in water, and 90% cumulative frequency within 0.420-0841 mm).

CAPSICUM FRUTESCENS; AEDES AEGYPTI; BIOCHEMISTRY; FORMULATIONS; INSECTICIDES; VECTORBORNE DISEASES; PEST CONTROL; FRUITS; PLANT EXTRACTS

Identity of the giant fig thrips (Thysanoptera) infesting Ficus nota (Blanco) Merr. in Leyte, Philippines. **Reyes, C.P. Cagayan State Univ., Tuguegarao (Philippines). Coll. of Agriculture. cecilia.reyes@csu.edu.ph., Gapasin, R.M. Visayas State Univ., Leyte (Philippines). Coll. of Agriculture. Mintu, C.B. Far Eastern Univ., Manila (Philippines). Dept. of Biology.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 162-165. 2020.*

Ficus nota (Blanco) Merr. (Moraceae), locally known as 'tibig' or 'tabog' is endemic to the Philippines. This species of fig is well known for its medicinal importance and is one of the high value trees planted and managed by rural households in the province of Leyte. The study aimed to established the identity of thrips or 'kulisipsip' associated with F. nota in the campus of the Visayas State University in Baybay, Leyte. Thrips samples were collected from 20 leaves selected randomly from 'Tibig' once a month from December 2018 to March 2019. Specimens were sorted under a stereomicroscope, cleared, mounted on slides using Canada balsam, and examined under a light microscope. The giant fig thrips, Gigantothrips elegans Zimmermann was the only species found. Thrips feeding damage on the leaves was severe. Larvae, female and male thrips fed on the underside of the leaves and were found aggregated. This result implies that the G. elegans population reproduced sexually and the aggregation suggests that pheromones were involved. Since this species of thrips is colonial or gregarious, aggregation pheromone-baited traps could be developed by future researchers to manage this insect pest.

FICUS; SPECIES; INDIGENOUS ORGANISMS; GYNAIKOTHRIPS; LEAF EATING INSECTS; DRUG PLANTS; PHILIPPINES

Isolation and characterization of bioactive compounds from seeds of ipil-ipil (Leucaena leucocephala) and its antifeedant activity against the third instar of common cutworm (Spodoptera litura). **Medina, E.E.R., Abrera, A.T., Manalo, M.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. mnmanalo@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 201-206. 2020.*

Bioactive compounds from ipil-ipil (Leucaena leucocephala) seeds were isolated using solvent extraction and silica gel column chromatography. Antifeedant activities of the crude ethanolic extract, chromatographic fractions and crystalline isolate were tested on third instar larvae of the common cutworm (Spodoptera litura). Dual choice assay using 10 mug/ sq cm applied on both adaxial and abaxial parts of castor (Ricinus communis) leaves showed that the crystalline isolate had the highest activity, with percentage relative feeding inhibition of 79.93% ± 1.00%. The very high melting point, together with data from chemical and spectroscopic analyses, suggests that the isolate is a saponin-containing complex with molar mass of 662 g/mol in the major component.

LEUCAENA LEUCOCEPHALA; SPODOPTERA LITURA; RICINUS COMMUNIS; CHROMATOGRAPHY; SOLVENT EXTRACTION; ANTIFEEDANTS; BIOPESTICIDES; PESTICIDE RESISTANCE; PESTICIDES; PESTICIDAL PROPERTIES; SAPONINS

Population structure of the banana black sigatoka pathogen [Pseudocercospora fijiensis (M. Morelet) Deighton] in Luzon, Philippines. **Mendoza, M.J.C., Ardales, E.Y. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Weed Science, Entomology, and Plant Pathology. eardales2009@gmail.com.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 211-219. 2019.*

Black Sigatoka has been considered as one of the important diseases of banana in the Philippines, however, no study has been done in the Philippines on the population structure of the pathogen- Pseudocercospora fijiensis. This research determines and analyzes the genetic diversity and genetic differentiation of the pathogen populations as well as phylogenetic relationships of the isolates in Luzon. Ten microsatellite markers were used for DNA fingerprinting of 164 P. fijiensis isolates obtained from 10 different banana-growing provinces in Luzon. Gene diversity estimate of 0.36 was obtained for the entire population. Subpopulations of P. fijiensis from Quezon and Batangas (FST: 0.34) were genetically distinct. Analysis of genetic differentiation showed that genetic divergence or similarity of subpopulations had no correlation to the geographic distance nor the genome group of the banana cultivar or origin of the isolates. Moreover, determination of the phylogenetic relationships among the isolates showed no correlation between the groupings or clusters

formed with either the geographical or cultivar origin of the isolates. AMOVA showed that the amount of variation was higher within subpopulations (85% within provinces and 96% within cultivars) than among subpopulations (15% and 4% among provinces and cultivars, respectively).

MUSA (BANANAS); BANANAS; PATHOGENS; PSEUDOCERCOSPORA; MICROSATELLITES; DNA; DNA FINGERPRINTING; PHYLOGENY; POPULATION STRUCTURE; GENETIC VARIATION; PLANT DISEASES

Quality profile and storage brhavior of onion (Allium cepa L. var. Red Pinoy) bulbs subjected to various preharvest insecticide treatment for the control of armyworm, Spodoptera exigua (Hubner) [Noctinidae:Lepidoptera]. **Gonzales, D.C.H., Dumlao, C.A.P., Lualhati, R.A.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Postharvest Horticulture Training and Research Center. Esguerra, E.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Navasero, M.V., Bato, M.R. Philippines Univ. Los Baños, College, Laguna (Philippines). National Crop Protection Center.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 156. 2019.*

Non-judicious use of insecticides can lead to pests developing resistance which could possibly be the reason for the heavy infestation of armyworm in major onion production areas in Nueva Ecija [Philippines] in 2016. Through a collaborative program with the National Crop Protection Center (NCPC), the quality, safety and storage behavior of 'Red Pinoy' onion bulbs harvested from onion farm subjected to preharvest applications of various insecticides (synthetic, biopesticides, and microbials) were evaluated. Bulbs were harvested at commercial maturity, cured for one week, cleaned then stored at 4.6±0.6 degrees C and 91.7% RH for 6 mo. Regardless of the kind of insecticides applied during bulb development and maturation, a high (98%) proportion of good quality bulbs were obtained. The level of pungency at harvest (mean of 4.91 mumole/g) did not vary among treatments and an increase was noted during cold storage with the highest level observed on the 4th month at 15.78 mumole/g. Total soluble solids content likewise did not vary significantly among treatments and did not change considerably during storage. As to the rheological properties, the various insecticides did not influence the bioyield and stiffness of bulbs within the same month of storage. Sprouting occurred on the 5th month of cold storage and the incidence was not influenced by the kind of insecticides used. Bulb decay was apparent on the 4th month of cold storage but the incidence was very low. Pesticide residues in bulbs were beyond the limit of quantification.

ALLIUM CEPA; ONIONS; VARIETIES; QUALITY; STORAGE; INSECTICIDES; SPODOPTERA LITURA; SMELL; SPROUTING

Strengthening CLSU [Central Luzon State Univ., Philippines] technical experts on responsible rice pest management. **Garcia, V.C., Carbonel, R.R., Fernando, M.C.M., Abon, C.C. Jr., Sicat, E.V. Philippine-Sino Center for Agricultural Technology, CLSU Compound, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 178. 2019.*

The course aimed to enjoin the participants on using environment-friendly pest control to improve the yield results of hybrid rice seed production and cultivation at the Philippine-Sino Center for Agricultural Technology (PhilSCAT) and to capacitate the staff on correct pest identification and application of integrated crop management technologies during crop development. Specifically, it intends to develop the participant's technical competence on Integrated Pest Management and improve their decision-making in managing rice ecosystem to maintain the pest population below the damaging level. Also, the training hope to achieve at least 40% increase in the participants' knowledge of level, which is manifested in their Gain-in Knowledge (GIK). A total of 33 Central Luzon State University Technical Experts (CLSU) from different Centers participated in the training wherein 46% were from PhilSCAT, 18% from the CLSU-Research Office, 15% from Ramon Magsaysay Center for Agricultural Environment Studies, 12% from University Business Affairs Program (UBAP), and 9% from CLSU-Extension Office. Instructional strategies used in the training are (30%) participatory lecture-discussion to bring out issues and concerns and to encourage active participation among trainees and (70%) field practicum and exercises to promote experiential learning and cognitive understanding of the concept or theory being introduced. Evaluating their performance, 92.3% positive increment was recorded based on the pre and post-tests of the participants. Majority of the participants said that they were satisfied with the training course and evaluated the overall rating of the course as excellent. The training was feed backed as commendable and the participants wanted to extend the training duration for more hands-on activities.

ORYZA SATIVA; HYBRIDS; SEED PRODUCTION; PEST CONTROL; TECHNOLOGY; TECHNOLOGY TRANSFER; TRAINING PROGRAMMES; DIFFUSION OF INFORMATION

Survival and plant damage assessment of Asian corn borer, Ostrinia furnacalis (Guenne), to single trait BT 11 maize. **Caasi-Lit, M.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Entomology Lab. mclit@up.edu.ph., Alpuerto, V.V. Former Asia Pacific IRM, Lead Syngenta, Philippines, Inc., 12/F Two World Square, 22 Upper McKinley Town**

Center, Fort Bonifacio 1630 Taguig City (Philippines). Lontoc, M.B.T., Pescadero, G.R., Dacuba, R.H., Bigcas, J.P., Elladora, E.V., Benigno, E.A. Philippines Univ. Los Baños, College, Laguna (Philippines).Entomology Lab. *Philippine Entomologist (Philippines). 0048-3753. v. 33 (1) p. 87-96. 2019.*

Field studies were conducted to determine the efficacy of single trait Bt corn product (Bt11xGA21) against the Asian corn borer, Ostrinia furcanalis (Guenee). The studies were set up in two sites, namely: Barangay [village] Carabatan Punta, Cauayan, Isabela and Barangay San Isidro, General Santos City, South Catobato, Philippines, at vegetative and reproductive stages of corn, for two seasons (dry and wet), and with artificial and natural infestation of Asian corn borer. No Asian corn borer survived on Bt corn (Bt11xGA21) during both vegetative and reproductive stages in both trial locations while survival of Asian corn borer on non-Bt (GA21) corn was consistently higher during reproductive stage of corn in both sites. Therefore, Bt maize, Bt11xGA21, remains highly efficacious against the Asian corn borer up to the present, since its commercial launch in the Philippines, a decade back.

ZEA MAYS; MAIZE; OSTRINIA FURNACALIS; PEST INSECTS; DEVELOPMENTAL STAGES; FIELD EXPERIMENTATION; INFESTATION; PEST RESISTANCE; DRY SEASON; WET SEASON

Understanding the behavior of eggplant fruit and shoot borer (EFSB): analysis from videos. **Magnaye, A.V., Madrid, V.R.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Computer Science. Taylo, L.D., Cainday, J.T., Hautea, D.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Plant Breeding. dmhautea@up.edu.ph.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 182. 2019.*

The eggplant fruit and shoot borer (EFSB), Leucinodes orbonalis Guenee is the most important insect pest of eggplant. The EFSB feeds on the shoots which causes wilting reducing the plant's apical dominance, and on the fruits producing feeding tunnels resulting to 50-70% yield loss. Host plant resistance is one of the insect pest management strategies that is sustainable, environment-friendly and compatible with other control methods. Elucidation of resistance mechanism is important in variety development with insect resistance traits. Tracking the EFSB's feeding patterns and larval behaviour, although tedious are important in identifying promising lines with resistance to the EFSB. This study explores the use of video motion tracking algorithms to design and develop a computer program that would enable researchers to track and document the larval movement precisely, rapidly, and with very little effort. Using a USB/web camera or an IP camera

connected to a computer, the program will track the movement, feeding patterns, and behavior of EFSB as input to determining the varieties more and least preferred for feeding.

SOLANUM MELONGENA; AUBERGINES; LEUCINODES ORBONALIS; BEHAVIOUR; PEST CONTROL; COMPUTER SOFTWARE

H20 - PLANT DISEASES

Characteristics of selected hybrids of abaca (Musa textilis Nee) with resistance to bunchy top. **Parac, E.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Weed Science, Entomology and Plant Pathology. epparac@carsu.edu.ph., Lalusin, A.G. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Pangga, I.B., Sta. Cruz, F.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Weed Science, Entomology and Plant Pathology. fcstacruz@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (1) p. 1-12. 2020.*

Two abaca hybrids namely, Hybrid 2 and Hybrid 7, which were delivered from a cross between the resistant wild banana (Musa balbisiana) var. Pacol and the susceptible abaca var. Abuab possessing the high fiber quality trait, have been previously selected with promising resistance to bunchy top disease. In this study, the responses of these hybrids to virus inoculation by the aphid (Pentalonianigronervosa) under screenhouse condition and to natural infection in the field were characterized. Under screenhouse condition, Hybrid 7 did not show the bunchy top disease symptoms of dark green streaks on veins and midribs, marginal leaf chlorosis, narrow and stiff leaves or upright and crowding of leaves at the apex of the plant, while Hybrid 2 expressed the disease in only 1 of 15 (7%) plants tested over the 6-mo observation period. The virus was not detectable by enzyme-linked immunosorbent assay (ELISA) using polyclonal antibody against Banana bunchy top virus (BBTV) in all asymptomatic Hybrid 2, Hybrid 7 and 'Pacol'. Plants were confirmed negative for BBTV when tested by polymerase chain reaction (PCR) using the primer pair BBT1 and BBT2 that Amplifies the 349-bp fragment of viral DNA-R component. The response was observed under condition of high disease pressure wherein the susceptible ‘Inosa’ and 'Abuab' developed severe disease characterized by high disease incidence, high amount of disease (measured by the Area Under Disease Progress Curve), and severe symptoms. The results observed under screenhouse condition were consistent with the response to natural infection involving plants that had been grown for 5 yr (2012-2017) in the field located at the Caraga State University, Ampayon, Butuan City, Philippines. Disease index was 4% for Hybrid 2 and 0% for Hybrid 7, indicating a resistant response to bunchy top. Knowledge on the resistance characteristics would be useful information for

proper filed development of these hybrids, and for breeding varieties with resistance to bunchy top.

MUSA TEXTILIS; MUSA BALBISIANA; ABACA; HYBRIDS; HYBRIDIZATION; CROSSBREDS; VIROSES; BANANA BUNCHY TOP VIRUS; DISEASE RESISTANCE

Documentation of success stories in the use of Trichoderma koningii in the Philippine highland farming systems. **Labon, K.O. Benguet State Univ., La Trinidad, Benguet (Philippines). Inst, of Social Research and Development. kacylabon@gmail.com., Batani, R.C., Lancio, R.C. Benguet State Univ., La Trinidad, Benguet (Philippines). Office of Extension Services. Macasangcay, T.D. Benguet State Univ., La Trinidad, Benguet (Philippines). Northern Philippines Rootcrops Research and Training Center. Laurio, C.C. Benguet State Univ., La Trinidad, Benguet (Philippines). Inst, of Social Research and Development. claurio@bsu.edu.ph.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 182. 2019.*

The technology of using Trichoderma Koningii as biological control agent in crop production in highland farming has been proven effective based on on-station and on-farm field experiments. However, the effectiveness and success of any R and D output is not in the development and delivery of the technology itself, but in the sustainable use and impact of these technologies by farmers in farmers' fields. This paper focused on examining the outcomes and impacts of Trichoderma Koningii through the documentation of individual success stories and experiences of farmer adopters. It used case study approach and in-depth interviews with more than five users and repeat users. Qualitative documentation showed that the effects of Trichoderma Koningii is most felt in terms of improvement in crop health, soil condition, and human health most seen in conventional and GAP farming. With the huge environmental and human health risks associated with chemical exposure for conventional and GAP farmers, the use of Trichoderma Koningii as substitute for synthetic fungicide was perceived to have significantly helped lower these risks among highland flower and vegetable farmers. Its use for organic farming, on the other hand, is largely as catalyst material for compost fertilizer. Based on the case study of a sweet potato producing community greatly affected with fusarium wilt, and personal accounts from farmers, the technology along with the use of tissue-cultured clean sweet potato planting materials showed positive impact in terms of both yield and survival rate. However, further study should be conducted to validate the effect of the technology when isolated from the effect of the clean planting materials used. Further documentation of additional success stories covering the use of the technology on other crops is also recommended.

IPOMOEA BATATAS; SWEET POTATOES; FUSARIUM; WILTS; BIOLOGICAL CONTROL AGENTS; TRICHODERMA KONINGII; TECHNOLOGY; TECHNOLOGY TRANSFER; HIGHLANDS; PHILIPPINES

Effects of different species from Trichoderma spp. on inducing systematic resistance in tomato plants infected by Cucumber mosaic virus. **AL-Jaddawi, A.A. King Abdulaziz Univ., Jeddah (Saudi Arabia). Biological Sciences Dept. Elbeshehy, E.K.F. University of Jeddah (Saudi Arabia). Biological Sciences Dept. esamelbeshehy@yahoo.com., Mattar, E.H.M. King Abdulaziz Univ., Jeddah (Saudi Arabia). Biological Sciences Dept.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 230-237. 2019.*

Cucumber mosaic virus (CMV) was obtained from naturally infected tomato (Solanum lycopersicum L.) plants showing yellowing leaves, mottling, leaf curl, and leaf shoestring. Infected samples were tested by direct ELISA with antiserum to CMV, and infected samples that had positive reactions to CMV antiserum were separated. Viral identity was confirmed by host range and serological tests. RT-PCR fragment of the expected size 512 bp was amplified. On the other hand, we studied the inhibitory effects of two Trichoderma species (Trichoderma harzianum and T. viride) on inducing systematic resistance in infected seedlings. The infected tomato seedling (control) had an average significant disease severity that was higher that of the other treatments, whereas tomato seedling treatment with PD1 and PD2 resulted in disease suppression of 98.20% and 98.80%, respectively, which was significantly higher than that of plants treated with PF1 protein patterns in healthy and infected tomato seedlings under inoculation by CMV were confirmed by a novel subunit of protein band numbers (10, 14, 19, 29, 43, 54, 55, 65, and 72) compared with PA. The absence of these protein bands in PA, PC, and PF1, PF2 and their presence in PB1, PB2 and PD1, PD2 could be attributed to the effects of treatment with Trichoderma. The results obtained suggest the potential for Trichoderma to protect tomato seedlings against CMV through stimulation of plants to produce pathogenesis-related (PR) proteins and activation of induced systemic resistance (ISR) against virus infection by accumulating secondary metabolites including terpenoids, phenolics, and alkaloids.

LYCOPERSICON ESCULENTUM; TOMATOES; TRICHODERMA; TRICHODERMA HARZIANUM; TRICHODERMA VIRIDE; IMMUNE SERUM; METABOLITES; PLANT VIRUSES; PLANT DISEASES; BIOLOGICAL CONTROL AGENTS; CUCUMBER MOSAIC CUCUMOVIRUS; DISEASE CONTROL

Evaluation of the curative effect of Cymbopogen nordus (L.) Rendle essential oil on Fusarium wilt of abaca (Musa textilis Nee). **Gaña, R.R.B. rbgana1@up.edu.ph., Ata, J.P., Manalo, M.Ma.Q. Philippines Univ. Los Baños, College, Laguna (Philippines). Forest**

Biological Sciences. *Ecosystem and Development Journal (Philippines). 2012-3612. v. 7 (1) p. 14-20. 2017.*

Abaca (Musa textilis), a native species in the Philippines, is a reforestation crop integrated in different agroforestry farming systems in the country. In this study, the effect of citronella (Cymbopogon nardus) essential oil was observed to inhibit mycelial growth of Fusarium oxysporum f.sp. cubense (E. F. Smith) W.C. Snyder and H.N. Hansen causing Fusarium wilt disease in abaca in vitro and its disease symptoms in vivo. Four different concentrations (0.001%, 0.025%, 0.05% and 0.1% v/v) were used for the in vitro assay within 21 days of observation. Mycelial growth was significantly inhibited in the 0.05% and 0.1% concentrations. For the in vivo assay, the 0.1% v/v concentration was used to test the efficacy of citronella essential oil in suppressing leaf symptoms of Fusarium wilt disease on Abaca seedlings using the Disease Severity Index (DSI). The Fusarium-inoculated seedlings with citronella essential oil had the highest DSI (2.8), followed by seedlings with inoculation but without essential oil (2.7), seedlings both without inoculation and essential oil (control) (1.6), and seedling without inoculation but with essential oil (1.13). Findings showed that citronella essential oil can lessen the occurrence of morphological symptoms such as leaf spots and anthracnose that are not visible symptoms of the Fusarium wilt disease.

CYMBOPOGON; SPECIES; ESSENTIAL OILS; MUSA TEXTILIS; FUSARIUM; WILTS

Morpho-cultural identification of wood-damaging fungi in the historic Baker Memorial Hall at the University of the Philippines Los Baños. **Fadriquela, C.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Forest Products and Paper Science. Rivarez, M.P.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Agriculture and Food Science. msrivarez@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 340-349. 2019.*

Deterioration in heritage wood structures caused by wood-decay fungi is a worldwide concern. In the University of the Philippines Los Baños, decay fungi from wooden canopies of the Baker Memorial Hall were identified and their degrading ability was evaluated. Specimen collection was conducted on degraded canopies made of Mayapis (Shorea palosapis) with signs of white or green fungal growth. Fungi associated with the rotting symptoms were isolated, purified, characterized and identified. Colonies of fungal isolates were fast-growing in malt extract agar (MEA), with colony diameter reaching 5.60 ± 0.43 cm (WRF8) and 5.15 ± 0.25 cm (WRF5) after a day. Mycelia of isolates were hyaline and rhizoidal on water agar. Isolate WRF5 produced green, raised colonies that imparted yellow pigmentation on potato dextrose agar (PDA) and MEA. Generally, colonies were raised, radially striated with green center and white margin on PDA. Average length and width of WRF5 conidia were 3.19 ± 0.33 µm and 2.73 ± 0.36 µm, respectively. Cross-referencing

morphological and cultural data with related literatures and identification keys indicated the isolated fungi were Trichoderma viride (WRF1), T. crissum (WRF3), T. reesei (WRF5), Rhizopus sp. (WRF8) and Coniophora sp. Furthermore, inoculation of 108 T. reesei conidia per mL on clean Mayapis wood blocks resulted in profuse growth, with average weight loss recorded at 8.81 ± 0.79% at 8 wk and 10.53 ± 0.88% at 14 wk which indicated a considerable but slow wood degradation.

SHOREA; SPECIES; WOOD DECAY; FUNGAL MORPHOLOGY; TRICHODERMA LONGIBRACHIATUM; WOOD PRESERVATION; CULTURAL HERITAGE; PHILIPPINES

Predictive modeling for chickpea blight (Ascochyta rabiei) occurrence in the semi-arid zone using meteorological data from Faisalabad, Pakistan. **Ahmad, S. University of Sargodha, Sargodha 40100 (Pakistan). Coll. of Agriculture. salman.ahmad@uos.edu.pk., Muhammad Aslam Khan. University of Agriculture, Faisalabad 38000 (Pakistan). Dept. of Plant Pathology. Ahmad, I. University of Agriculture, Faisalabad 38000 (Pakistan). Dept. of Forestry and Range Management. Ashraf, E. University of Sargodha, Sargodha 40100 (Pakistan). Coll. of Agriculture. Aatif, H.M. Bahauddin Zakariya Univ., Multan 60000 (Pakistan). Layyah Campus. Ali, A., Safdar, M.E., Anjum, M.Z., Raza, W. University of Sargodha, Sargodha 40100 (Pakistan). Coll. of Agriculture.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 330-339. 2019.*

Chickpea blight is the most destructive disease in the semi-arid zone of Punjab and is mainly controlled through fungicides. However, in this area, the use of fungicides is excessive and non-judicious which could be rationalized through the use of a predictive model based on meteorological variables. The aim of the current research was to develop a disease predictive model of chickpea blight based on temperatures (maximum and minimum), rainfall, relative humidity (RH), and wind speed. Relationship of meteorological variables with disease severity was determined through correlation analysis, and stepwise regression was used to develop the model. For this purpose, 2 yr (2011-12) data of meteorological variables and chickpea blight severity was used. A significant correlation was found between all environmental variables and blight severity. A model based on weekly meteorological variables fit the data well (R2 = 0.82). Predictions of the model were evaluated on two statistical indices, root mean square error (RMSE) and error (%), which were less than or equal ± 20, indicating that the model was good. The model was validated with 5 yr (2006-10) independent data set. Homogeneity of the regression equations of the two models, 2 yr (2011-12) and 5 yr (2006-10), showed that they validated each other. Scatter plots showed that blight severity was high at maximum (20-24 deg C) and minimum (12-14 deg C) temperatures, 65-70% RH, 5-6 mm rainfall and 5-6.5 km/h wind speed). The chickpea blight model developed during this study is the first meteorological variable model in the semi-arid zone of Punjab and will help to make the predictions of chickpea blight well

before the occurrence of the disease; thus, the model can make early an prediction of the time of fungicide application, lessen the use of fungicides, curtail input cost of farmers, and help to mitigate environmental pollution.

ASCOCHYTA RABIEI; CHICKPEAS; BLIGHT; WEATHER DATA; WEATHER FORECASTING; EPIDEMIOLOGY; FUNGICIDES; CROP MODELLING; PAKISTAN

Rice dwarfs virus (RDV) detection in the Nephotettix nigropictus (Stal) and rice plant, and field reaction of rice cultivars against RDV in the Philippines. **Rillon, J.P. Philippine Rice Research Inst., Science City of Muñoz, Nueva Ecija (Philippines). Crop Protection Div. jp.rillon@philrice.gov.ph., Duque, M.J.C. Philippine Rice Research Inst., Science City of Muñoz, Nueva Ecija (Philippines). Plant Breeding and Biotechnology Div. Alili, R.P. Central Luzon Sate Univ., Muñoz, Nueva Ecija (Philippines). Ramos Magsaysay Center for Agricultural Resources and Environment Studies. Imbat, J.B., Cantila, I.M.B. Midsayap, 9410, North Cotabato (Philippines). Rillon, G.S. Philippine Rice Research Inst., Science City of Muñoz, Nueva Ecija (Philippines). Crop Protection Div. Padolina, T.F. Philippine Rice Research Inst., Science City of Muñoz, Nueva Ecija (Philippines). Plant Breeding and Biotechnology Div. Tiongco, E.R. Philippine Rice Research Inst., Science City of Muñoz, Nueva Ecija (Philippines). Crop Protection Div.** *Philippine Entomologist (Philippines). 0048-3753. v. 33 (1) p. 61-73. 2019.*

The rice dwarf disease generally occurs in temperate rice growing countries. Its occurrence in the Philippines was reported in 1994 based on transmission studies, electron microscopy of the virus particles, and serological assay of infected plants. A simple nucleic acid amplification technique called the loop-mediated isothermal amplification (LAMP) was applied to detect Rice Dwarf virus (RDV) in field collected insect vector, Nephotettix nigropictus (Stal), individuals and rice plants. Samples were crudely lysated with alkaline lysis method. LAMP successfully detected RDV in both insect vector and plant hosts at 60 deg C in 60 min. Visual scores of rice dwarf diseased plants in the National Cooperative Trial (NCT) 2014 dry season test showed that rice lines developed for the upland ecosystem obtained the highest infection rate (13.89%); nearly as high as the TN1 check plants (15.21%) while the Multi-Adaptation Trial (MAT) lines obtained the lowest (059%). In the 2015 wet season NCT trial, the Traditional rice group recorded the highest percentage of infection (4.81%) followed by those in the direct wet seeded rice (DWSR) category (3.47%) while rice entries in MAT and Transplanted categories obtained the two lowest infection of 1.20% and 1.25%, respectively. The TN1 check variety recorded 2.54 % infection. A 0.4% rice dwarf disease incidence was recorded in a field survey in the rice production area of the PhilRice Midsayap Branch station during the 2015 DS cropping. The average number of N. Nigropictus in the NCT and rice production fields ranged from 0-4.33 for 10 insect net sweeps.

ORYZA SATIVA; NEPHOTETTIX NIGROPICTUS; LEAF EATING INSECTS; PESTS OF PLANTS; PLANT DISEASES; PLANT VIRUSES; INFESTATION; NUCLEIC ACIDS; NUCLEIC PROBES

Wild sunflower (Tithonia diversifolia) used as biofumigation for increased productivity and sustainability of potato production in Northern Mindanao [Philippines]. **Tatoy, B.F., Savani, J.B. Department of Agriculture Region 10, Antonio Luna St. Cagayan de Oro City (Philippines). Research Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 35. 2019.*

Bacteria wilt and limited supply of quality seeds are the most important factors that limit the expansion of potato production in Northern Mindanao [Philippines]. Farmer-seed saved caused 50% to 75% bacterial wilt incidence and reduced yields to as low as 7.5 t/ha. This research was conducted to determine the bacterial wilt incidence, yield and economics of the introduced potato seed system using wild sunflower for biofumigation,and to determine the productivity of the produced seeds in commercial scale.The study was conducted in Imbayao, Malaybalay City with the participation of 42 farmers. Finding show that the technology of potato seed system was technically feasible, economically viable, socially acceptable and sustainable. Shredded leaves and young stem sunflower applied at the rate of 2.5 kg/sq m in a raised bed and allowed 15 days of decomposition before planting suppressed bacterial wilt incidence on potatoes and reduced the seed cost per tuber from Php 2.50 price to Php 1.24. In addition, the produced seeds when planted increased yield from 7.5 t/ha to 25.91 t/ha using the seeds produced from the plot treated with sunflower and increased return on investment to Php 5.48. Reusing the seeds produced from t/ha. The repeated planting of potato by the farmers using the introduced technology and the adoption by a private farm of this technology are indicative of the social acceptance and sustainability of the technology for potato farming. Thus, the technology is recommended for dissemination to farmers to help address limited seed supply and bacterial wilt problem in potato.

TITHONIA DIVERSIFOLIA; HELIANTHUS ANNUUS; WILD PLANTS; PLANT PRODUCTS; POTATOES; WILTS; FUMIGATION

H50 - MISCELLANEOUS PLANT DISORDERS

Allelopathic response of spiny amaranth (Amaranthus spinosus L.) to mechanical leaf damage. **Aram, N.A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). National C rop Protection Center. Bariuan, J.V. Philippines Univ. Los Baños, College, Laguna**

(Philippines). Inst. of Weed Science, Entomology and Plant Pathology. 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 26-27. 2019.*

Amaranthusspinosus L. is a weed known to exhibit allelopathy which releases allelochemicals which may negatively affect the growth of other plants (Ferguson et al, 2003). This study conducted at the Institute of Weed Science, Entomology and Plant Pathology, University of the Philippines Los Baños in 2018, aimed to determine the effect of mechanical leaf damage and sampling time after defoliation to the allelopathic expression of spiny amaranth. Bioassay on Raphanus sativus and Lactuca sativa was laid out as two-factorial in Completely Randomized Design with defoliation percentage (0, 10, 20, 30) and sampling time (0, 6, 12, 24 hours) as factors and accumulated germination index and radicle length as test parameters. Higher accumulated germination index indicates better performance of seedlot. Inhibitory properties of spiny amaranth to radish and lettuce were enhanced with increasing degree of defoliation and time delay after defoliation. Thirty percent defoliation resulted to lowest accumulated germination index (10.6) in lettuce and radish (6.85), as well as lowest radicle length (15.66 mm) in lettuce. Lowest radicle length (37.20 mm) in radish was observed at 20% defoliation. In terms of time delay, after defoliation, radish had lowest accumulated germination index (7.41) at 6 hours, showing an immediate allelopathic response while lettuce had its lowest germination index (10.60) at 24 hours. On the other hand, time delay of 24 hours after defoliation resulted to lowest radicle length (34.95 mm) in radish and lettuce (15.66 mm). Phytochemical test showed that there were more allelochemicals present in defoliated than in on the high proportions in defoliated leaf extracts, while high proportions of phenols and terpenoids and low proportion of flavonoids were found in undefoliated extracts. Defoliation increased the allelopathic potential of spiny amaranth to radish and lettuce.

AMARANTHUS SPINOSUS; ALLELOPATHY; ALLELOCHEMICALS; LEAF FALL

Field screening of high yielding varieties of sugarcane (Saccharum Sp.) for waterlogging tolerance ground in upland and lowland conditions. **Gandia, J.L., Delfin, E.F., Descalsota, M.L.V. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Peña, M.C., Samson, E.G. La Granja Research and Training Station, La Carlota City, Negros Occidental (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 24-25. 2019.*

Severe flooding as a result of climate change may threaten sugarcane yield. The study investigated the effect of waterlogging on lowland and upland-grown sugarcane during the early stalk elongation stage. and screening for waterlogging-tolerant genotypes. In 2017-2018, two split-plot trials at the IPB experimental area (upland trial, Type I climate) and UP La Granja, La Carlota City, Negros Occidental (lowland trial, Type II climate) evaluated the response of ten high yielding varieties (HYVs) to flooding for 2 weeks during stalk elongation stage. Waterlogged sugarcane varieties showed location-dependent differential response in terms of projected ton cane per hectare (tc ha-1) and sugar yield per hectare (LKg/ha). Waterlogging has affected cane and sugar yield with Phil 00-2569, Phil 00-1419, and Phil 2155 accruing losses of 35.8% (30 tc/ha), 32.7 (23.9 tc/ha), and 30.7% (23.9 tc/ha) due to waterlogging, despite out-performing other genotypes on well-drained plots. All other varieties have yields not highly affected by waterlogging, save for Phil 05-1763 that favored waterlogged growth by 36.4% (16.3 tc/ha). Genotype Phil 2003-1389 lost 40.7% (37.73 tc/ha) cane yield in the lowland compared to the uplandsetup. Phil 00-1419, Phil 2155, Phil 2006-1899, Phil 8013, and 200-0791 follow suit losing lowland cane yield by 45.3% (27.3 tc/ha), 31.8% (18.6 tc/ha), 18.9% (12.7 tc/ha), and 20.1% (12.3 tc/ha), respectively, compared to upland conditions. Phil 00-2569, Phil 2006-2289 and Phil 2004-1011 gained 62% (62.1 Lkg/ha), 42,3% (38.6 Lkg/ha) and 33.1% (30.7 Lkg/ha) more sugar yield in the lowand due to superior juice quality. Projected cane and sugar yield for certain varieties have shown to be variable as affected by waterlogging based on location, climate, with certain varieties favoring growth in one area, while growing poorly in the other.

SACCHARUM; SPECIES; SUGARCANE; HIGH YIELDING VARIETIES; FIELD EXPERIMENTATION; WATERLOGGING; CROP YIELD

Improved water stress tolerance of advanced maize populations derived from open-pollination varieties of IPB Var 6 and IPB Var 13. **Adorado, P.J., Sanchez, Ma. A.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Plant Breeding. Ocampo, E.T. Philippin es Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 26. 2019.*

The Institute of Plant Breeding at the University of the Philippines Los Baños has developed notable white corn varieties IPB Var 6and IPB Var 13 which are known for their superior eating qualities but are also greatly affected by waterlogging and water deficit. Thus, advanced populations derived from these varieties with double stress (drought and waterlogging) tolerance were selected initially under waterlogged and drought conditions. Selections were randomly mated for at least 2 generations, resulting in improved IPB Var 6

populations Cycle 0, Cycle 1, Cycle 2 WLT (waterlogging tolerant), and Cycle 2 DS (double stress-tolerant); and advanced IPB Var 13 populations Cycle 0 and Cycle 1. The advanced populations from both varieties and checks (Hybrid NK 8840, 30G80, Lagkitan and Super Sweet) were grown during 2018 DS in Pangasinan under two different water regimes waterlogging and drought. Randomized Complete Block Design were used for all field experiments. Under waterlogging condition the number of adventitious roots and ears were determined. IPB Var 13 Cycle 1 plants had more adventitious roots (average of 10.51 roots) than IPB Var 6 Cycle 1 (average of 5.32 roots). Under drought stress, the date of tasselling and silking was recorded. The anthesis-silking interval (ASI) ranged from 4.8 days to 7 days, with a mean of 5 days. IPB Var 13 Cycle 1 had the shortest ASI, while IPB Var 13 Cycle 0 had the longest. IPB Var 13 Cycle 1 had a more prolific yield under both water stresses than IPB Var 6-derived populations. Over-all, IPB Var 13 Cycle 1 had the most promising results under stress among the improved populations. These improved populations are planted in different stressed environments to verify stress tolerance and to possibly recommend as alternative varieties for planting during predicted drought periods and in known waterlogged environments.

ZEA MAYS; VARIETIES; WATERLOGGING; DROUGHT STRESS; AGRONOMIC CHARACTERS

Morphological responses of mungbean (Vigna radiata (L.) R. Wilczek) genotypes under waterlogging stress at vegetative stage. **Arcillas, L.S., Rafanan, K., Delfin, E., Enicola, E. Philippines Univ. Los Baños, College, Laguna (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 27. 2019.*

Mungbean (Vignaradiata (L.) R. Wilczek) is an important leguminous crop in the Philippines. One of the strategies to mitigate the effects of climate change on mungbean production is through the selection and development of waterlogging-tolerant varieties. Twelve mungbean genotypes were evaluated for waterlogging tolerance at the Institute of Plant Breeding, CAFS, UPLB [Philippines] at the vegetative stage in 2019 Dry Season laid out in RCBD in four replicates. Three-week old seedlings were subjected to 7- and 14-day waterlogging with water level maintained at 2 cm above the soil surface during the stress duration and allowed to drain after the waterlogging period. The selection included Pag-asa 5 and 15, PHL 12881, PHL 12959, five breeding lines (5238, 5240, 5244, 5247, 5248) produced from PHL 12950-G (tolerant) x P19 (susceptible), parentals, and PHL 14296 (check). Significantly higher SPAD recovery, and relative root, stem and leaf weight were observed at 7-day than at 14-day waterlogging. However, the latter had significantly higher mean root score, and adventitious root length and surface area, which can be a response to longer flooding duration. Significant treatment x genotype interaction has been observed

on adventitious root length and surface area. Based on the weight of plant parts and SPAD recovery, all breeding lines had comparatively higher growth recovery than the check and parentals. Based on the adventitious root formation, two of these lines (5247 and 5248) have comparable results with the check and PHL 12950-G. Since the relative survival, recovery, and suppression of mungbean genotypes under different treatments showed no significant difference, waterlogging has little effect on plant survival but has a significant effect on growth, which consequently affects production. Shorter stress exposure allowed plants to recover, while longer exposure reduced the recovery of the mungbean plants. Furthermore, the breeding lines showed the potential of improving a susceptible parent,Pag-asa 19, by crossing with a tolerant parent PHL 12950-G.

VIGNA RADIATA; MUNG BEANS; GENOTYPES; WATERLOGGING; STRESS; EVALUATION

Physico-biochemical and antioxidative responses of different salt-sensitive sunflower (Helianthus annuus L.) genotypes. **Hosain, M.S. Bangladesh Agricultural Research Inst., Gazipur 1701(Bangladesh). Central Lab. lslam, M.U. Bangladesh Agricultural Research Inst., Gazipur 1701 (Bangladesh). Oil Research Centre. Molla, M.R. Bangladesh Agricultural Research Institute, Gazipur 1701 (Bangladesh). Plant Genetic Resources Centre. Hassanuzzaman, M. Sher-e Bangla Agricultural Univ., Dhaka-1207 (Bangladesh). Dept. of Agronomy. Rohman, M. Bangladesh Agricultural Research Inst., Gazipur 1701 (Bangladesh). Molecular Breeding Lab. motiar_1@yahoo.com.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 256-274. 2020.*

Salinity is one of the important abiotic stresses affecting growth, photosynthesis, ion accumulation, and antioxidant defense systems in sunflower (Helianthus annuus L.). This study investigated the physio-biochemical and antioxidative responses in different salt-sensitive sunflower genotypes: GP-4030 and BARISurzumukhi 2 as newly identified tolerant genotypes, PS-2 as sensitive and Hysan 33 as standard tolerant. Salt stresses caused higher reduction in relative water content (RWC), chlorophyll (Chl) content, K+ and K+/ Na+ ratio, photosynthetic rate (pN), transpiration rate (E), stomatal conductance (gs), and intercellular CO2 concentration rate (Ci) in salt-sensitive genotype. This genotype had higher NA+, superoxide (O2.-), hydrogen peroxide (H2O2), lipid peroxidation (MDA) and proline (Pro) content than the tolerant genotypes. The tolerant genotypes maintained higher Pro content than the salt-sensitive genotypes under salt stress. All the tolerant genotypes had higher increment of superoxide dismutase (SOD), catalase (CAT) and peroxidase (POD) activities under salinity (12 dS m-1) than the salt-sensitive genotype. Similarly, increment of ascorbate peroxidase (APX) and glutathione reductase (GR) activity was higher in the tolerant, genotypes, but glutathione peroxidase (GPX) activity was higher in salt-sensitive genotype. However, both monodehydroascorbate reductase (MDHAR) and

dehydroascorbate reductase (DHAR) activities decreased with salinity level. Glutathione S-transferase (GST) activity increased in all the genotypes under salinity and was higher in the tolerant genotypes. Higher accumulation of Pro, along with improved physiological and biochemical parameters in the tolerant genotypes, can confer tolerance by reducing oxidative damage through up-regulating defense under salinity.

HELIANTHUS ANNUUS; GENOTYPES; PHOTOSYNTHESIS; ION EXCHANGE; SOIL SALINITY; ANTIOXIDANTS; OSMOTIC STRESS; STRESS; OXIDATION; RESISTANCE TO INJURIOUS FACTORS; GROWTH CONTROL; GROWTH FACTORS; BANGLADESH

Physiological responses of high yielding sugarcane (Saccharum sp.) varieties to drought stress. **Delfin, E.F., Carpentero, A.S. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 28-29. 2019.*

Sugarcane is known to exhibit significant yield loss under drought due to its high water requirement, and identification and utilization of stress-tolerant varieties remains to be one of the recommended strategies to cope with environmental stresses. The study focuses on the physiological response often high-yielding sugarcane varieties subjected to 2-month drought during stalk elongation stage (5 months after ratooning). It followed a split-plot design in RCBD with two water regimes, drought and well-watered. Data gathering began 4-weeks after drought imposition, include physiological traits i.e. stomatal conductance chlorophyll content, scavenging activity and electrolyte leakage and morphological traits i.e. number nodes, plant height and stalk diameter.Significant differences were observed between varieties and treatments for all parameters. A significant treatment x variety interaction was also observed in the experiment. For total chlorophyll content reduction (20.65%-64.72%) in all varieties was observed in the drought treatment relative to control. Most of the varieties evaluated increased their antioxidant activity under drought, except for PHL2003-1389 which had comparable antioxidant activities in the drought and control treatments. Enhanced antioxidant activities as reflected by high scavenging activity were observed in PHL2006-1899, PHL2004-1011, PHL2000-1419 and PHL8013. Lower electrolyte leakage which reflected better membrane stability was observed in several varieties under stress, except PHL 2006-2289 and PHL2000-2569. Among varieties, only PHL2000-1419 had comparable stomatal conductance readings under control and drought while the other varieties were observed to have reduced stomatal conductance under drought. Correlation analysis showed a negative relationship between both electrolyte leakage and stomatal conductance with plant height, stalk diameter, node and tiller number. Conversely, positive correlation between both scavenging activity and total chlorophyll content with the

morphological traits was observed. The variations in physiological responses could potentially be responsible for the differences in susceptibility of each variety and could provide valuable information for variety recommendation and development.

SACCHARUM; SPECIES; HIGH YIELDING VARIETIES; DROUGHT STRESS; ANTIOXIDANTS; DROUGHT; ELECTROLYTES

Plasticity in nodal root hardpan penetration, deep soil water uptake, and shoot dry matter production under soil moisture fluctuations using chromosome segment substitution lines of rice. **Nguyen, D.T., Suralta, R.R., Kano-Nakata, M., Mitsuya, S., Owusu-Nketia, S., Yamauchi, A. Nagoya Univ., Nagoya 464-8061 (Japan). International Cooperation Center for Agricultural Education.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 214-234. 2020.*

Rainfed lowland (RFL) fields generally experience soil moisture fluctuations (SMF) and have a hardpan layer that impedes deep rooting during episodes of drought. The development of root systems in response to SMF and the ability of roots to elongate through the hardpan when it becomes relatively soft during re-watering are key rice traits to efficiently extract water at the deep soil during subsequent periods of drought. Thus, this study aimed to identify their chromosome segment substitution lines (CSSLs) from Sasanishiki and Habataki crosses, which have root plasticity exhibited in response to SMF, which enables plants to penerate the hardpan and develop deep root systems. Root plasticity was evaluated by comparing root traits between each of the 39 CSSLs and their recurrent parent, Sasanishiki, under water-stressed and well-watered 9WW control) conditions in hydroponics and soil-filled pots. Among the 39 CSSLs. three (SL34, SL35 and SL39) had similar growth as Sasanishiki under WW, but were able to produce greater shoot dry weight than their recurrent parent under transient soil moisture stress in hydroponics and soil culture. Under SMF, in the rootbox-pinboard and rootbox-hardpan systems, only SL39 showed a significantly greater root system development than Sasanishiki, SL39 also had a more enhanced root aerenchyma formation than Sasanishiki in the shallow layer during drought-rewatered conditions under SMF, possibility facilitating atmospheric O2 diffusion to the root tips. As a consequence, SL39 promoted nodal root elongation through the hardpan during rewatering and subsequent greater deep root system development to access more water from the deep soil during the drought period of SMF, relative to Sasanishiki. The results implied that SL39 can be a good genetic material to study the QTL associated with plasticity in root hardpan penetration and deep root system development in rice.

ORYZA SATIVA; RICE; ROOT SYSTEMS; ROOTING; SOIL WATER CONTENT; FLOODED RICE; UPLAND RICE; FIELDS; QUANTITATIVE TRAIT LOCI; RHEOLOGICAL PROPERTIES; DRY MATTER CONTENT; HYDROPONICS; DROUGHT RESISTANCE; SOIL; DROUGHT

Using anthesis-to-silking interval to identify drought tolerant genotypes from the Philippine nature corn germplasm collection. **Austria, R.E.G., Descalsota, J.C., Ocampo, A.M. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Ocampo, E.T.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 27-28. 2019.*

The Identification of drought-tolerant maize genotypes present in the national germplasm collection is the first step towards the development of locally-sourced planting materials that exhibit adaptability to water scarcity. The analysis of secondary traits resulting from adaptive responses to stress may improve selection efficiency versus the use of grain yield alone, as suggested by several studies showing the significant correlation between the anthesis-silking interval (ASI) and grain yield, particularly under drought stress.To test for the ASI and grain yield relationship under drought stress of the Philippine native corn germplasm collection, 162 maize genotypes from the collection were subjected to drought under field conditions in Sta. Barbara, Pangasinan from January to May 2018. Two replications were set up in a randomized complete block design, considering each individual genotype as a treatment.A specific watering regime for drought tolerance evaluation was applied to coincide with water stress at flowering inorder to maximize the effect on yield performance. Only 27% of the screened genotypes produced sufficient data for correlation analysis. Ear length, ear diameter, number of ears, and moisture content observations indicated positive correlation ($p < 0.01$, 0.92, 0.89, 0.83, and 0.17NS.respectively), while ASI had negative correlation ($p < 0.01$, -0.34). ASI ranged from 3-7 days in the top 10tons/ha) had ASI ranging from 5-8 days. Grain yield decreased by approximately 3.33% per day with increase in ASI up to 6 days. Data suggest that drought-tolerant maize genotypes may be selected from the Philippine corn germplasm collection effectively through secondary trait evaluation, particularly ASI, in conjunction with a strategic watering scheme.

ZEA MAYS; INDIGENOUS ORGANISMS; GENOTYPES; DROUGHT RESISTANCE; DROUGHT STRESS; FLOWERING; PHILIPPINES

Variation in shoot and root responses of eggplant(Solanum molengena L.) under mild drought and flooding conditions. **Masanga, A.P.L., Hautea, D.M. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Suralta, R.R. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Crop Biotech Center. Niones, J.M. Philipp ines Univ. Los Baños, College, Laguna (Philippines). Inst. of**

Crop Science. Lapio, P.L.G. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. de Guzman, C.C., Ocampo, E.T.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Coron, Palawan (Philippines). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 28. 2019.*

Eggplant (Solanum melongena L.) is an economically important crop in the Philippines that is potentially exposed to drought and waterlogging. While several drought studies in eggplant have been reported, studies on eggplant under waterlogged conditions are limited. This study assessed the variations among eggplant genotypes for shoot and root traits grown under mild drought and waterlogging applied at the vegetative and reproductive stages. The experiments were set-up in the greenhouse using gravimetric approach in the application of terminal drought, 60% field capacity (FC), and waterlogged treatments. The treatments were laid-out in split-plot in RCBD with developmental stage as the main-plots. The study was conducted in 2017 to 2018 at the PhilRice Central Experiment Station, Maligaya, Science City of Muñoz, Nueva Ecija, Philippines.At the vegetative stage, larger change in plant height and smaller lateral roots were observed in terminal drought treated plants compared to the control. At the reproductive stage, a smaller difference in plant height and longer basal root length were observed in the terminal drought treated plants. Yield was maintained or even improved in some genotypes under drought stress at 60% FC compared to the well-watered control, indicating a potential to reduced water requirements for their productions. Under waterlogged treatment applied at both vegetative and reproductive stages, plants were significantly smaller change in plant height, and smaller leaf area, root length and root volume compared to the control. All traits were inhibited under waterlogged stress. Significant genotypic variations in yield were also observed under both drought and waterlogged treatments. Further studies will be done to quantify maximum rooting depth and density per depth in larger root boxes and increases intensity of drought stress conditions.

SOLANUM MELONGENA; GENOTYPES; DROUGHT; WATERLOGGING; AGRONOMIC CHARACTERS; ROOTS; SHOOTS

Water use and water efficiency of good eating quality Korean varieties under vegetative stage soil moisture deficits. **Cruz, A.S. ascruz@phirice.gov.ph., phascruz0726@gmail.com., Cabral, M.C.J., Niones, J.M., Suralta, R.R. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Rice Chemistry and Food Science Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City

(Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no . 1) p. 161. 2019.*

In the Philippines, high yielding Korean rice varieties are being adopted because of their good eating qualities. The Philippines has drought-prone rainfed environments which demand breeding of genotypes with high yielding and drought tolerance ability. Dry matter production under drought is a product between water use (WU) and water use efficiency (WUE). This study quantified the relationship between dry matter with WU and WUE among selected Korean rice varieties under drought. Five Korean varieties such Dasanbyeo, Gayabyeo, Hanareum2, Milyang 23 and Saegyejinmi together with IR64 were grown in rootbox for 40 days and subjected to two water treatments: continuously waterlogged (CWL) and progressive drought (PDR, 10% SMC). Under drought, Dasanbyeo showed the least reduction among genotypes at 22.93% in shoot dry weight (SDW). Total leaf area also showed similar pattern of response with that of SDW. Correlation analyses showed that the varietal differences in SDW under drought had negative relationship with WU but had positive relationship with WUE indicating that differences among Korean varieties in shoot dry matter production in response to drought was due to their genotypic differences in maintaining higher photosynthetic efficiencies under the condition. Our results validated our previous findings that higher dry matter production in Korean varieties tested was greatly contributed by their greater ability to maintain high WUE (shoot related trait) rather than WU (root related trait). Further studied are being conducted to further quantify and characterize their photosynthetic efficiencies under drought stress.

ORYZA SATIVA; VARIETIES; DROUGHT STRESS; WATER DEPRIVATION; SOIL WATER CONTENT; WATER USE; EFFICIENCY

Yield and yield component assessment of high yielding sugarcane varieties under water deficit. **Carpentero, A.S., Gandia, J., Maravilla, A.M.B., Reyes, J.A.O., Descalsota, M.L.V., Santos, P.J.A. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding. Rosales, J.H., Yaptenco, R. Philippines Univ. Los Baños, College Laguna (Philippines). Coll. of Engineering and Agro-Industrial Technology. Delfin, E.F. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 23-24. 2019.*

Water deficit is an important constraint of crop production that severely reduces sugarcane yield. Growing of drought-resilient sugarcane varieties can alleviate drought problems by reducing yield losses. Ten high-yielding sugarcane varieties developed by Sugarcane

Regulatory Agency (SRA) were evaluated for drought tolerance under field condition on December 2017-December 2018 at the Institute of Plant Breeding. The study was laid out in a split-plot design with 3 replications, two water regimes (with-irrigation and without-irrigation) as main plots and varieties as sub-plots. Drought treatment was imposed by withholding irrigation at tillering stage (3 months after planting) for 2 months followed by a recovery period and grown until 12 months for harvesting. The 10 HYVs were evaluated in terms of agronomic and physiological traits. Throughout the stress imposition, NDVI, canopy temperature and chlorophyll content were gathered weekly. Generally, the HYVs differed significantly in terms of stalk height, diameter, number of nodes, cane yield, NDVI, Brix and fiber content across water treatments. Drought significantly affected stalk height, stalk diameter and number of nodes resulting in a significant reduction in cane (41.8%) and sugar (41.4%) yield across varieties. NDVI values obtained during stress did not differ significantly between water treatments although it was found to be highly correlated with cane and sugar yield. Phil 2004-1011, Phil 2006-1899, and Phil 2000-1419 were the highest cane and sugar yielders under drought treatment with cane yields of 71.19, 68.75, 66.94 tc/ha, respectively and sugar yield of 138.07, 134.64, 132.69 Lkg/ha. Respectively. Water treatment by variety interaction was not significant among traits evaluated while juice quality measured in terms of Brix, polarity and apparent purity were not significantly affected by drought. Results showed the resiliency of Phil 2004-1011 as indicated by its high cane and sugar yield under drought and low reduction in yield (25-28%).

SACCHARUM OFFICINARUM; SUGARCANE; HIGH YIELDING VARIETIES; AGRONOMIC CHARACTERS; DROUGHT; DROUGHT RESISTANCE; DROUGHT STRESS

H60 - WEEDS AND WEED CONTROL

Bioherbicidal activity of Medinilla magnifica Lindl. leaf extract. **Tinio, J.C.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. Rayos, A.L. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Aguila, M.J.B., Salamanez, K.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. kcsalamanez@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 270-275. 2019.*

The bioherbicidal activity of kapa-kapa (Medinilla magnifica Lindl.) was studied for the first time. Phenolics from its leaves were extracted with 7:7:6 methanol-acetone water (MAW). The phenolics of the crude extract were quantified using the Folin-Ciocalteu method and values of 71.86 mg Ga*/g extract for total phenolics and 29.58 mg QUE*/g extract for total flavonoids were obtained. The crude extract was subjected to acid hydrolysis and the bioherbicidal activity of the resulting hydrolysate was determined. Lettuce seed germination assay was done and the median lethal dose LD50 value shows that it has great

potentials for use against weeds. The extract inhibited the growth of Echinochloa crus-galli, Cyperus iria, and Ludwigia hyssopofolia, with E. crus-galli showing the greatest sensitivity among the three species. Total chlorophyll content of soybean was reduced by the extract. This suggests that the acid-hydrolyzed extract of M. magnifica decreased chlorophyll production, resulting in reduced biomass of the test weeds.

ORNAMENTAL PLANTS; ECHINOCHLOA CRUS GALLI; WEEDS; INFLORESCENCES; INDIGENOUS ORGANISMS; WEED CONTROL; PHENOLIC COMPOUNDS; PLANT EXTRACTS; HERBICIDES; PESTICIDES; GERMINATION; SEEDS; LEAVES; PLANT EXTRACTS; PESTICIDAL PROPERTIES

J - POSTHARVEST TECHNOLOGY

J10 - HANDLING, TRANSPORT, STORAGE AND PROTECTION OF AGRICULTURAL PRODUCTS

Postharvest behavior of biriba [Rollinia mucosa (Jacq.) Baill.] fruits at different storage temperatures. **Barrios, H.A. habarrios@up.edu.ph., Esguerra, E.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Postharvest Horticulture Training and Research Center.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 255-261. 2019.*

Biriba [Rollinia mucosa (Jacq.) Baill.] is delicate to handle and has very short shelf life of less than a week thereby limiting its marketability. This study was conducted to determine the effect of varying temperatures on the postharvest behavior and storage life of biriba fruits. Storage temperature affected the physiological and physical characteristics of biriba fruit and subsequently its storage life. Higher respiration rates of 54.7 and 44.0 mg CO2 kg/1h were obtained at ambient condition and 20 deg C, respectively, compared with 32.8 mg CO2 kg/h at 13 deg C. However, the amount of ethylene produced was almost similar at all temperatures ranging from 38 to 41 muL kg/h. Fruit softening coincided with the peak in ethylene production at ambient and at 20 deg C while at 13 deg C, it was on the second peak. Storage at ambient (29-31 deg C) and at 20 deg C resulted in 9.5% and 10.4% moisture loss, respectively. at 13 deg C, moisture loss was 7% at 15 d. Total soluble solids(TSS) and titratable acidity (TA) at the end of storage were the same but pH was slightly lower in fruits stored at 13 deg C than at the other temperatures. Though variations in pulp color and sourness were observed, pulp consistency, sweetness, and overall acceptability ratings of the pulp were the same. Fruits kept at ambient and at 20 deg C lasted for 5 and 8 d, respectively, whereas fruits kept at 13 deg C lasted for 15 d with satisfactory eating quality.

ANNONA SQUAMOSA; VARIETIES; INDIGENOUS ORGANISMS; POSTHARVEST CONTROL; POSTHARVEST PHYSIOLOGY; TEMPERATURE; STORAGE; PACKAGING; HANDLING; KEEPING QUALITY; RIPENING

J11 - HANDLING, TRANSPORT, STORAGE AND PROTECTION OF PLANT PRODUCTS

Effects of 1-methylcyclopropene (1-MCP) post-cutting treatment on the storage quality of fresh-cut white dragon fruit (Hylocereus undatus). **Castillo-Israel, K.A.T. kattcastillo@yahoo.com., kcisrael@up.edu.ph., Valenzuela, R.A., Oliveros, B.R.R., Bainto, L.C., Gandia, J.B.L. Philippines Univ. Los Banos, College, Laguna (Philippines). Food Science Cluster. Absulio, W.A. Philippines Univ. Los Banos, College, Laguna (Philippines). Postharvest and Seed Science Div.** Israel, K.A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology. kattcastillo@yahoo.com., kcisrael@up.edu.ph. Use of the ethylene antagonist 1-methylcyclopropene (1-MCP) to prolong the storage life of minimally processed tropical fruits and vegetables. TR-1781. College, Laguna (Philippines). 2016.

To determine the potential of the ethylene antagonist 1-methylcycloropene (1-MCP) as a tool in maintaining the storage quality of fresh-cut white dragon fruit variety. It was applied as a post-cutting treatment at a concentration of 5ppm by injecting gaseous 1-MCP into packs of dragon fruit slices in PET tray overwrapped with LDPE stretchable film. After 1-MCP treatment, samples were stored at 5-10 deg C and monitored for deterioration parameters during storage. Physiological responses such as ethylene and CO2 production were measured using gas chromatography. Physico-chemical parameters such as pH. TSS, TA, firmness, color and visual quality were also monitored during storage. Microbial analyses were also performed such as total plate count, yeasts and mold count and total coliform count. 1-MCP was observed to cause a significant increase in ethylene production while no effect on CO2 production were noted. Visual quality ratings were higher with the 1-MCP treatment while lesser extent of water-soaking was obtained also with the 1-MCP treated fruits. Lesser browning was also observed in the 1-MCP treatment which became predominant starting at day 5 storage. Lightness (L*) was likewise higher starting at day 5 and onwards. 1-MCP also caused a decline in pH values which corresponded to a higher % TA. Firmness and total soluble solids were not influenced by 1-MCP. Microbial counts were considered safe until day 7 storage based on limits set by European Union countries, with 1-MCP treated fruits having slightly lower total aerobic bacterial counts and yeasts and mold counts.

HYLOCEREUS UNDATUS; VARIETIES; CUTTING; STORAGE; KEEPING QUALITY; CHEMICOPHYSICAL PROPERTIES

Efficacy of 1-methylcyclopropene (1-MCP) post cutting treatment of the storage quality of fresh-cut 'Queen' pineapple (Ananas comosus (L.) Merr. cv. 'Queen'). **Bernardino, M.A., Castillo-Israel, K.A.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Food Science Cluster. kattcastillo@yahoo.com., kcisrael@up.edu.ph., Serrano, E.P. Philippines Univ. Los Baños, College Laguna (Philippines). Postharvest and Seed Sciences Div. Gandia J.B.L. Philippines Univ. Los Baños, College, Laguna (Philippines). Food Science Cluster. Absulio, W.L. Philippines Univ. Los Baños, College Laguna (Philippines). Postharvest and Seed Sciences Div.** Israel, K.A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology. Use of the ethylene antagonist 1-methylcyclopropene (1-MCP) to prolong the storage life of minimally processed tropical fruits and vegetables. TR-1781. College, Laguna (Philippines). 2016.

The efficacy of 1-methylcyclopropene (1-MCP) applied as a post-cutting treatment on fresh-cut 'Queen' pineapple was determined in order to assess its potential to maintain the storage quality of fresh-cut 'Queen' pineapple, a major Philippine variety, 1-MCP at a concentration of 1 uL/L was applied post-cutting by injecting the gas into packed fresh-cut 'Queen' pineapples in polypropylene tray overwrapped with LDPE stretchable film. The packed fruits were stored at 5 deg C and monitored for headspace gas concentrations (ethylene, CO2, O2), visual quality deterioration parameters and microbial deterioration indicators. 1-MCP was found to effectively elicit its ethylene inhibiting action as shown by lowered headspace ethylene by about 40% at day 4 storage. Headspace CO2 levels were likewise lowered headspace ethylene by about 40% at a day 4 storage. Headspace CO2 levels were likewise lowered by 1-MCP to about 50% at day 2 while higher headspace O2 levels were generally obtained which had the highest increase at day 2 ((about 18%) which created an improved modified atmosphere condition inside the package compared with the control. No significant effects on the visual quality were noted throughout storage. Color differences were however observed, with 1-MCP treatments having significantly higher lightness values and higher hue values at day 2, 1-MCP did not affect the microbial growth (aerobic bacteria, acid-forming bacteria, yeasts and molds, coliforms) on the samples during storage. Aerobic bacteria count was slightly lower than the control at day 3. The fresh-cut pineapple packaged in the manner described had a shelf-life of 3 days based on the microbial limits set by EU countries which log 7 cfu/mL aerobic plate count. To the best of knowledge, this is the first study which demonstrated the effects of 1-MCP on fresh-cut pineapple of the 'Queen' variety.

ANANAS COMOSUS; VARIETIES; PINEAPPLES; CUTTING; STORAGE; KEEPING QUALITY

Efficacy of 1-methylcyclopropene post-cutting treatment on the fresh-cut papaya (Carica papaya L. cv. 'Sinta') storage quality using two packaging forms. **Relox, P.E., Castillo-Israel, K.A.T. Philippines Univ. Banos, College, Laguna (Philippines). Food Science Cluster.**

kattcastillo@yahoo.com., kcisrael@up.edu.ph., Serrano, E.P., Absulio, W.L. Philippines Univ. Los Banos, College, Laguna (Philippines). Postharvest and Seed Science Div. Gandia, J.B.L. Philippines Univ. Banos, College, Laguna (Philippines). Food Science Cluster. Israel, K.A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology. Use of the ethylene antagonist 1-methylcyclopropene (1-MCP) to prolong the storage life of minimally processed tropical fruits and vegetables. TR-1781. College, Laguna (Philippines). 2016.

The study was conducted to determine the efficacy of 1-methylcyclopropene (1-MCP) post-cutting treatment of fresh-cut 'Sinta' papaya (Carica papaya L. cv. 'Sinta) in maintaining its storage quality using two packaging forms commonly used commercially namely PET tray wrapped with LDPE stretchable plastic film, and PET clamshell plastic containers. Fresh-cut 'Sinta' papaya cubes at Peel Colour Index 5 (yellow with tinge of green) were packaged using plastic tray wrapped with plastic film and clamshell plastic containers. 1-MCP gas was introduced post cutting inside the packaging to a final concentrations of 2.5 nl/L. The fresh cuts were stored at 10 deg C and 95% RH. Samples were-evaluated for headspace C2H4 (HS-C2H4), headspace CO2 (HS-CO2) polygalacturonase (PG) activity, total reducing sugars were observed in 1-MCP treatments compared with controls at certain storage days. In plastic tray-film packaging, lower HS-C2H4 levels were observed in 1-MCP treated fresh-cuts compared with the control. In clamshell packaging, significant differences in water soaking, luminosity and VQR at days 2 and 3 were observed between 1-MCP treated and control fruits. All of the treatments, on day 2 of storage, complied with European Union countries' limits on aerobic plate counts (7 log), yeasts and molds counts (5 log) and coliform counts (3 log). to the best of knowledge, this is the first study on the efficacy of 1-MCP post cutting treatment on fresh-cut papaya of the 'Sinta' variety and also the use in a 1-MCP study of the packaging forms mentioned. The use of the ethylene antagonists 1- methylycopropene (1-MCP) to prolong the storage life of minimally processed tropical fruits and vegetables.

CARICA PAPAYA; VARIETIES; CUTTING; STORAGE; KEEPING QUALITY; PACKAGING

Physicochemical and sensory characteristics of three varieties of shrunken 2 sweet corn (Zea mays L.) as affected by harvest maturity and period of storage. **Evangelista, G.C. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Human Nutrition and Food. Israel, K.A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology. Barrion, A.S.A. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Human Nutrition and Food.** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 41-57. 2017.*

Optimum harvest maturity and storage time of sweet corn are important for farmers to maximize profit by selling good quality produce. In this study, these parameters were

determined by evaluating the physicochemical and sensory characteristics of three commercial varieties of shrunken 2 sweet corn as affected by harvest maturities (18, 20 and 22 days after 100% silking) and period of storage (1,3,5 days). As harvest maturity was extended, mass, total soluble solids and force gauge values generally increased while tenderness decreased. Conversely regardless of variety, the mass, TSS, tenderness and sensory characteristics decreased while mass loss and hardness increased with period of storage. Period of storage had negative correlations with TSS and sensory characteristics. On the other hand the more tender the kernel, the sweeter, juicer and more acceptable it was. No substantial relationship was found between TSS and perceived sweetness and tenderness. On the other hand, vitamin A content was not affected by harvest maturity. The results of the study showed that harvest maturity and period of storage had an effect on some of the physicochemical and sensory characteristics of sweet corn while the physicochemical and sensory characteristics also affect each other.

ZEA MAYS; MAIZE; VARIETIES; STORAGE; TIME; HARVESTING; MATURITY; ORGANOLEPTIC PROPERTIES; CHEMICOPHYSICAL PROPERTIES

Physiological and physical responses of packaged minimally processed pinakbet vegetables to 1-methylcyclopropene (1-MCP) pre-cutting. **Negrillo, S.L.C., Castillo-Israel, K.A.T. kattcastillo@yahoo.com., kcisrael@up.edu.ph. Gandia, J.B.L. Philippines Univ. Los Banos, College, Laguna (Philippines). Inst. of Food Science and Technology. Absulio, W.L., Serrano, E.P. Philippines Univ. Los Banos, College, Laguna (Philippines). Postharvest Horticulture Training and Research Center.** Israel, K.A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology. kattcastillo@yahoo.com., kcisrael@up.edu.ph. Use of the ethylene antagonist 1-methylcyclopropene (1-MCP) to prolong the storage life of minimally processed tropical fruits and vegetables. TR-1781. College, Laguna (Philippines). 2016.

The physiological and physical responses of minimally processed pinakbet vegetables (MPPV) to-1-MCP pre-cutting treatment were evaluated to determine its possible use as a tool in maintaining the storage quality. Pinakbet mix vegetables consisting of string beans, okra, bitter gourd, eggplant and squash were exposed to 3ppm 1-MCP prior to cutting, followed by packaging in PET trays overwrapped with PVC cling film and storage at 8-10 deg C. Physical quality indices such as browning of the cut edges, color changes, firmness and overall visual quality were determined for each vegetable in the pack. Physiological changes were also measured as changes in concentration of headspace, ethylene, carbon dioxide and oxygen. The pre-cutting application of 3 ppm 1-MCP levels which correlates with the decreased headspace oxygen concentrations. However, it did not affect the respiration rate as headspace carbon dioxide was maintained close to 1%. The pre-cutting application of 3 ppm 1-MCP to MPPV maintained storage quality of vegetables as shown by suppressed

development by brown spots in string beans. The formation of white blush in squash was also significantly alleviated and firmness was retained. Discoloration of eggplant was also lessened as shown by L* a*, and b* values. No effect on okra and bitter gourd were also observed. Pre-cutting 1-MCP application can be potential tool in maintaining storage quality of minimally processed pinakbet vegetable mix. To the best of knowledge, this is the first report on the application of 1-MCP on pinakbet vegetable mix to test its efficacy in maintaining its storage life.

VEGETABLES; STORAGE; PACKAGING; CUTTING; KEEPING QUALITY

Quality profile and storage brhavior of onion (Allium cepa L. var. Red Pinoy) bulbs subjected to various preharvest insecticide treatment for the control of armyworm, Spodoptera exigua (Hubner) [Noctinidae:Lepidoptera]. **Gonzales, D.C.H., Dumlao, C.A.P., Lualhati, R.A.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Postharvest Horticulture Training and Research Center. Esguerra, E.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Navasero, M.V., Bato, M.R. Philippines Univ. Los Baños, College, Laguna (Philippines). National Crop Protection Center.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 156. 2019.*

Non-judicious use of insecticides can lead to pests developing resistance which could possibly be the reason for the heavy infestation of armyworm in major onion production areas in Nueva Ecija [Philippines] in 2016. Through a collaborative program with the National Crop Protection Center (NCPC), the quality, safety and storage behavior of 'Red Pinoy' onion bulbs harvested from onion farm subjected to preharvest applications of various insecticides (synthetic, biopesticides, and microbials) were evaluated. Bulbs were harvested at commercial maturity, cured for one week, cleaned then stored at 4.6±0.6 degrees C and 91.7% RH for 6 mo. Regardless of the kind of insecticides applied during bulb development and maturation, a high (98%) proportion of good quality bulbs were obtained. The level of pungency at harvest (mean of 4.91 mumole/g) did not vary among treatments and an increase was noted during cold storage with the highest level observed on the 4th month at 15.78 mumole/g. Total soluble solids content likewise did not vary significantly among treatments and did not change considerably during storage. As to the rheological properties, the various insecticides did not influence the bioyield and stiffness of bulbs within the same month of storage. Sprouting occurred on the 5th month of cold storage and the incidence was not influenced by the kind of insecticides used. Bulb decay was apparent on the 4th month of cold storage but the incidence was very low. Pesticide residues in bulbs were beyond the limit of quantification.

ALLIUM CEPA; ONIONS; VARIETIES; QUALITY; STORAGE; INSECTICIDES; SPODOPTERA LITURA; SMELL; SPROUTING

Responses of ready-to-eat salad vegetable mixes prepared with different lettuce varieties 1-methylcyclopropene. **Marquez, K.L.D., Castillo-Israel, K.A.T. Philippines Univ. Los Banos, College, Laguna (Philippines). Inst. of Food Science and Technology. kattcastillo@yahoo.com., kcisrael@up.edu.ph. Serrano, E.P. Philippines Univ. Los Banos, College, Laguna (Philippines). Postharvest Horticulture Training and Research Center. Gandia, J.B.L. Philippines Univ. Los Banos, College, Laguna (Philippines). Inst. of Food Science and Technology. Absulio, W.L. Philippines Univ. Los Banos, College, Laguna (Philippines). Postharvest Horticulture Training and Research Center.** Israel, K.A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology. kattcastillo@yahoo.com., kcisrael@up.edu.ph. Use of the ethylene antagonist 1-methylcyclopropene (1-MCP) to prolong the storage life of minimally processed tropical fruits and vegetables. TR-1781. College, Laguna (Philippines). 2016.

A post-cutting treatment of 1-methylcyclopropene (1-MCP) was applied to ready-to eat salad vegetable mixes (RTE-SVM) consisting of lettuce, carrots and cucumber to determine its potential in maintaining the storage quality. The responses of different varieties of lettuce were also compared. Minimally-processed lettuce (Corelle, Romaine and Iceberg varieties), Japanese cucumber, and carrots were prepared and packed in PET trays then sealed with PVC cling wrap film. 1-MCP gas was injected in the packs to have a final concentration of 1ppm and 3ppm inside the RTE-SVM packs. The packs were stored in a cold room (5-8 deg C) until they became unacceptable as a whole, but the shelf life and limit of marketability of the packs were set when the packs reached an average VQR of 6 (Fair, moderate, defects). Headspace gas analyses (oxygen, carbon dioxide, and ethylene) and visual evaluation (visual quality rating, lettuce wilting and yellowing, carrots discoloration, and cucumber water-soaking) were performed. The RTE-SVM prepared with Corelle lettuce had the highest average VQR, lowest incidence of wilting and yellowing and carrots discoloration when treated with 3ppm 1-MCP. The RTE-SVM packs prepared with Iceberg and Romaine lettuce, on the other hand, can be treated with 1 ppm 1-MCP to educe the incidence of lettuce wilting and yellowing and carrots discoloration in the packs. Furthermore, it was determined that the RTE-SVM prepared with Corelle, Romaine, and Iceberg lettuce can be stored for 8, 10 and 5 days, respectively, at 5-8 deg C before reaching the limit of marketability.

LACTUCA SATIVA; CUCUMIS SATIVUS; LETTUCES; VARIETIES; SALADS; CUTTING; STORAGE; KEEPING QUALITY; ETHYLENE

Seed quality maintenance:sun-drying or mechanical drying? **Brena, S.R. sr.brena@philrice.gov.ph., rcramos@philrice.gov.ph., Ramos, R.C. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines) . Genetic Resources Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 158. 2019.*

Drying rice seeds after harvest plays crucial role in the availability of high quality seeds for planting and storage. In the Philippines, sun-drying is the most common method used by farmers and seed grower though the procedure is whether dependent. Despite the availability of various types of mechanical dryers, farmers do not use this method because some allegedly attribute the low germination rates of rice seeds when dried mechanically. The study aims to determine the effect of drying methods on the quality of stored rice seeds. NSIC Rc160 seeds harvested in dry and wet season 2018 were used in the study. Half of manually harvested seeds were dried in cemented pavement with liner from 7:00 AM to 11:30 AM only and half were dried in flat-bed dryer. Moisture content for both drying methods ranged from 12-13%. Seeds in each dying procedure were cleaned separately using seed cleaner. Seeds were packed in ordinary plastic sack at 25kg per sack then stored in PhilRice seed warehouse under ambient condition. Seed testing for viability and vigor were done after 3, 6, and 9th months of storage. In dry season, results showed that there were no significant differences in seed viability after 9 months, however, lower seed vigor was observed in all treatments after 9 months. Seeds harvested using combine harvester had lower seed vigor noted after 6 months compare to those harvested manually. The results proved that high quality rice seed can be maintained in storage for six months using either solar-drying or mechanical drying.

RICE; SEEDS; QUALITY; NATURAL DRYING; SEED; VIABILITY; SEED CHARACTERISTICS; VIGOUR

Storage quality of fresh-cut Philippine 'Carabao' mango (Mangifera indica L. cv. 'Carabao') fruits with 1-methylcyclopropene (1-MCP) post-cutting treatment. **Castillo-Israel, K.A.T. kattcastillo@yahoo.com., kcisrael@up.edu.ph., Gandia, J.B.L., Velez, A.C.G. Philippines Univ. Los Banos, College, Laguna (Philippines). Food Science Cluster. Absulio, W.L. Philippines Univ. Los Banos, College, Laguna (Philippines). Postharvest and Seed Sciences Div. Bainto, L.C. Philippines Univ. Los Banos, College, Laguna (Philippines). Food Science Cluster.** Israel, K.A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology. kattcastillo@yahoo.com., kcisrael@up.edu.ph. Use of the ethylene antagonist 1-methylcyclopropene (1-MCP) to prolong the storage life of minimally processed tropical fruits and vegetables. TR-1781. College, Laguna (Philippines). 2016.

The effects of 1-methylcyclopropene (1-MCP) post-cutting treatment on the storage quality of fresh-cut Philippine 'Carabao' mango (Mangifera indica L. cv. 'Carabao') were determined. Gaseous 1-MCP at a concentration of 1 uL/L based on the package volume was injected into packed fresh-cut mangoes at stage 5 maturity. The packaging form used was polyethylene terephthalate (PET) tray overwrapped with low density polyethylene (LDPE) cling wrap film. Samples were stored at 5°C and monitored for storage quality parameters. Ethylene concentration inside the package varied during storage where considerably lower levels were observed at day 5 with the 1-MCP treated samples. CO2 concentration was significantly lower only at day 1. O2 concentration was lowered by 1-MCP until day 4. Visual quality rating and browning index were not affected by 1-MCP while less water-soaking was observed in the 1-MCP treated samples throughout storage. Higher pH and total soluble solids were obtained in 1-MCP treated samples while total acidity was lower. No significant variations in color were noted between the treatments. 1-MCP was found to cause a decline in total plate count at day 5 while yeasts and molds count did not vary. No coliforms were detected all throughout storage. Shelf-life of fresh-cut 'Carabao' mango was determined to be 7 days based on the limits set by European Union(EU) countries for aerobic bacteria and yeasts and molds count. 1-MCP was found to impart better storage quality of fresh-cut 'Carabao' mango, hence can be a potential tool in extending its shelf-life. To the best of our knowledge, this is the first study on the application of 1-MCP of fresh-cut mango of the 'Carabao' variety.

MANGIFERA INDICA; MANGOES; STORAGE; CUTTING; KEEPING QUALITY

Use of the ethylene antagonist 1-methylcyclopropene (1-MCP) to prolong the storage life of minimally processed tropical fruits and vegetables. **Israel, K.A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology. kattcastillo@yahoo.com., kcisrael@up.edu.ph.** TR-1781. College, Laguna (Philippines). 2016.

To determine the potential of the ethylene antagonist 1-MCP as a tool in prolonging the shelf-life of minimally processed of fresh-cut tropical fruits and vegetables, 1-MCP was applied as a gas injected to the packaged commodities. The optimum gas concentration and packaging type were optimized. The responses to 1-MCP such as physico-chemical. visual, biochemical, sensory and microbial changes were monitored during cold storage. Positive responses were observed in pineapple, dragonfruit and mango, while fair results were obtained in papaya, watermelon and muskmelon. For the vegetation mixes, 1-MCP was found for prolong storage file of pinakbet mix and garden fresh salad mix.

FRUITS; PINEAPPLES; MANGOES; PAPAYAS; WATERMELONS; MELONS; VEGETABLES; STORAGE; KEEPING QUALITY; ETHYLENE; CUTTING; CHEMICOPHYSICAL PROPERTIES; ORGANOLEPTIC PROPERTIES

K - FORESTRY

K01 - FORESTRY - GENERAL ASPECTS

Assessment of farmer's climate change resiliency in selected Community-Based Forest Management areas in Laguna, Philippines. **Lalican, E.R. Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development, Paseo de Valmayor, Economic Garden, Los Baños (Philippines). erlalican@gmail.com.** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 30(1) p.23-45. 2020.*
https://erdb.denr.gov.ph/2020/09/08/sylvatrop-volume-30-no-1-january-to-june-2020/

The study assessed the farmer's resiliency to climate change in selected Community-Based Forest Management (CBFM) sites in Laguna [Philippines]. The analysis was limited only to socio-economic characteristics, agroforestry system's supporting services and regulating services as these have an immediate effect on farmer's resiliency and socio-economic productivity. Stratified random sampling was used for household sampling in CBFM sites. Furthermore, direct on-site measurement for ecosystems services and interview schedule were used in evaluating the factors used for the analysis. Farmer's resiliency was determined through 'resiliency scoring'. Result of analysis revealed that PO members in Liliw, Laguna have moderate to high degree of resiliency to climate change while all non-PO members have moderate resiliency to climate change. All farmer respondents would adapt with the effect of climate change by looking for other sources of income, government support, and adopting other farming techniques. There is a strong association between the membership status (member or non-member) and the intensity of resiliency (highly or moderate) of the respondents.

FOREST MANAGEMENT; COMMUNITY FORESTRY; CLIMATIC CHANGE; FARMERS; PHILIPPINES

Estimation of carbon sequestration rates and carbon densities of fast-growing tree plantations in Mindanao, Philippines. **Lantican, N.L.M. lml212001@yahoo.com., Sy, M.U. Department of Environment and Natural Resources, College, Laguna (Philippines). Ecosystems Research and Development Bureau.** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 30 (1) p. 47-65. 2020.*

https://erdb.denr.gov.ph/2020/09/08/sylvatrop-volume-30-no-1-january-to-june-2020/

The study formulated accurate and reliable estimations of carbon sequestration rates and carbon densities of fast growing tree species in Mindanao. Species used include, bagras (Eucalyptus deglupta Blume) falcata (Paraserianthes falcataria (L.) Nielsen), mahogany (Swietenia macrophylla King), mangium Willd.) and yemane (Gmelina arborea Roxb.). Two hundred fourteen permanent sampling plots (PSPs) were established in private and government tree plantations aged 1, 4 and 7 years old across the 5 regions in Mindanao. The carbon (C) sequestration rates, the carbon densities, and their carbon dioxide (CO2) equivalent were determined using available allometric equations for the 5 tree species. Results showed that falcata had the highest predicted mean tree carbon sequestration rate of 15.339 kg/tree/yr and mean carbon dioxide equivalent of 56.293 kg/tree/yr from age 1 to 9 years. Mangium followed with 10.326 kg/C/tree/yr and 37.897 kg CO2/tree/yr. For bagras, 5.700 kg C/tree/yr equal to 17.756g CO2/tree/yr. On the other hand, a mahogany tree in a plantation that grows up to 8 years has a rate of 4.152 kg C/tree/yr equivalent to 15.237 kg CO2/tree/yr. Yemane, for its part, had a rate of 4.221 kgC/tree/yr equivalent to 15.6 kg CO2/tree/yr. The mean carbon density of the established plantations of 5 species in Mindanao had an overall carbon density of 7.364 tons/ha/year translating to 27.027 tons/ha/year of carbon dioxide. It is suggested that similar research be conducted on Philippine native trees and agroforesty species that are cognizant for their carbon sequestration potentials in mitigating climate change.

EUCALYPTUS DEGLUPTA; PARASERIANTHES FALCATARIA; SWIETENIA MACROPHYLLA; ACACIA MANGIUM; PLANTATIONS; CARBON DIOXIDE; PHILIPPINES

Greenhouse gas inventory towards a greener and globally competitive industrial tree plantation sector. **Racelis, D.A. Philippines Univ. Los Banos, College, Laguna (Philippines). Inst. of Renewable Natural Resources.** 2020 UPLB Centennial Professorial Chair Lecture. Via online (Zoom meeting platform). 21 Sep 2021.

The lecture sought to: a)discuss the rationale, basic concepts, and principles of GHG inventory; b)describe the GHG inventory framework and protocol; c)elaborate the various activities along the ITP production chain whee GHG fluxes occur; d)explain how GHG inventory will enable the ITP sector to become more productive, profitable and globally competitive as a green industry; and e)recommend strategies to reduce GHG emissions from ITP production chain and maximize carbon sequestration in durable wood products. The ITP sector could have significant contribution to the country's economy if not for a number of barriers that prevent it from becoming a major industry. Plantation threes could be harvested much earlier compared to those grown in temperate countries which could have afforded the local tree farmers a competitive advantage in the world market.

Unfortunately, the sector does not have access to the market owing to its failure to adopt and institutionalize forest certification, that could have ligned it with the green economy. For one, it should be able to demonstrate that it has minimal contribution to the total global greenhouse gas emission. It can only be done by conducting GHG inventory on the entire ITP production chain. GHG inventory involves a process that records, summarizes, analyzes, and reports the quantity of carbon emissions by sources and removals by sinks as a direct result of human activities. It covers three copies, namely: a)Scope 1: It considers all direct GHG emissions from sources controlled or owned by the reporting project or firm. This includes vehicle or equipment, both the moving and stationary sources that use fuels the project operations; b)Scope 2: These are indirect GHG emissions from consumption of purchased electricity, heat or steam and cooling. These emissions are a consequence of activities conducted within the organizational boundaries of the reporting entity, but actually occur at sources owned or controlled by another entity; and Scope 3: Other indirect emissions such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities not covered in Scope 2, outsourced activities, waste disposal, etc. GHG emissions from the ITP sector activities that include harvesting, minor and major log transport, and veneer and lumber production were elaborated in the lecture. the carbon stored in lumber and veneer was also computed. Specially, the calculated GHG emissions (CO2e) from harvesting, minor log transport, and major log transport operations amounted to 0.006 Mg m-3, 0.077 Mgm-3, and 0.059 Mg m-3 respectively. Moreover, veneer and production resulted to GHG (CO2e) emissions of 0.197 Mg m-3 and 0.0146 Mg-m3, respectively. Likewise, the computed amount of carbon stored in lumber and veneer equal to 0.126 Mg m-3. Further analysis shows that lumber and veneer production have a net GHG emission of 0.266 Mg m-3 and 0.317 Mg m-3, respectively which implies a storage of CO2 in/from veneer and lumber. The adoption of GHG inventory could revitalized the ITP sector through the adoption of sustainable and climate-friendly ITP practices, optimization of production chain operations, energy-efficient wood products utilization and product innovations and access of Philippine forest products to the world market. The lecture recommended the following: a)formulate policies that promote efficiency, transparency and competitiveness in the ITP sector; b)the concerned agencies like DENR should come up with intervention programs in terms of trainings, seminars and fora relative to the production of good quality planting materials and efficient post-harvest operations to encourage private tree plantation farmers in he Region to engage in falcata production; c)there is a need for the government to invest on improving farm-to-market roads to address the problem in transporting logs from the stumpsite to the nearest roadside: and 4)retooling of processing facilities and retraining of personnel involved in the entire production chain to make them more efficient and competitive in the world market.

GREENHOUSE GASES; WOOD PRODUCTS; CARBON; FORESTS

K10 - FORESTRY PRODUCTION

Literature mining on dipterocarps: towards better informed natural regeneration and reforestation in Luzon, Philippines. **Gabud, R.S., Batista-Navarro, R.T. Philippines Univ. Los Baños College, Laguna (Philippines). Inst. of Computer Science. Mariano, V.Y. Royal Melbourne Inst. of Technology Univ., Ho Chi Minh City (Vietnam). Mendoza, E.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Yap, S.L. Far Eastern Univ., Manila (Philippines).** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 29 (2) p. 39-53. 2019.*
https://erdb.denr.gov.ph/2020/05/01/sylvatrop-volume-29-no-2-july-to-december-2019/
Access to comprehensive information is critical in Natural Resource Management (NRM). While information resources largely shape the decision-making process of conservation policy regulators, significant barriers could present themselves at any point along the NRM information supply pipeline. Similarly, these barriers could appear in the management of the natural regeneration and reforestation of lowland dipterocarp forests in the Philippines, Moreover, the supra-annual mass flowering of dipterocarps occurs in irregular intervals, thus predicting the likelihood of their natural regeneration, to subsequently make plans for reforestation is an extremely complex task. This study aimed to address information gaps by utilizing text mining, which is the automatic process of extracting structured information from documents such as scientific publications, books, and agency reports. The results were based on a preliminary version of the annotated document collection or corpus. The reliability of the corpus was determined by inter-annotator agreement (IAA). Satisfactory IAA was obtained for taxon and geographic location concept types with 90.35% and 93.82% F-scores, respectively. This corpus could provide NRM policy-makers with a searchable database on the distribution and mass flowering of Philippine dipterocarps for dipterocarp species regeneration and reforestation.

DIPTEROCARPACEAE; REFORESTATION; DATA PROCESSING; ACCESS TO INFORMATION; DATA ANALYSIS; DATA PROCESSING; PHILIPPINES

L - ANIMAL SCIENCE, PRODUCTION AND PROTECTION

L01 - ANIMAL HUSBANDRY

Couple invested in an urban chicken forum to foster food security and sustainability. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 16; 18-19. 2021.*
https://agriculture.com.ph/2020/09/16/a-couple-invested-in-an-urban-chicken-farm-to-foster-food-security-and-sustainability-part-1/

CHICKENS; BREEDS (ANIMALS); ANIMAL PRODUCTION; ANIMAL BREEDING; URBAN AREAS; FARMING SYSTEMS; FOOD SECURITY; SUSTAINABILITY

Physico-chemical properties of beeswax from four different honey bee (Apis) species, chemicophysical properties. **San Gabriel, E.V. evsangabriel@up.edu.ph., Matanguihan, D.A.P., Perico, P.D.R., Micor, J.R.L., Manalo, M.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. Polintan, E.A., Barrion-Dupo, A.L.A., Cervancia, C.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences.** *Philippine Entomologist (Philippines). 0048-3753. v. 33 (1) p. 1-10. 2019.*

Physico-chemical parameters such as melting point, density, acid value, iodine absorption number, and saponification value were determined for different beeswax samples extracted from the honey combs of Apis mellifera Linneaus, A. Cerana Fabricius, A. Dorsata Fabricius, and A. Breviligula Maa taken from three different locations in the Philippines. The average mean values calculated from A. Mellifera, A. Cerana, A. Dorsata, and A. Breviligula, respectively, are as follows : melting point (in deg C): 62.81 ± 0.18, 64.35 ± 0.17, 59.28 ± 0.18, and 59.44 ± 0.24; density (in g/mL) : 0.9546 ± 0.0035, 0.9611 ± 0.0092, 0.9838 ± 0.0167, and 0.9691 ± 0.0109; acid value (in mg KOH/g) sample) : 16.22 ± 0.23, 5.90 ± 032, 5.21 ± 0.28, and 4.68 ± 0.25; iodine absorption number (in g/100 g sample) : 4.35 ± 0.39, 4.70 ± 0.42, 4.52 ± 0.38, and 5.41 ± 0.23; and saponification value (in mg KOH/g sample) : 94.20 ± 4.92, 99.2 ± 2.2, and 94.9 ± 3.9.

APIS CERANA; HONEY BEES; SPECIES; BEESWAX; CHEMICOPHYSICAL PROPERTIES; MELTING POINT; DENSITY; HONEYCOMBS; SAPONIFICATION NUMBER; APICULTURE

Twelve-year-old dairy farm offers fresh milk from grass-fed cows. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 11-14. 2021.*

DAIRY COWS; FEEDING; DAIRY FARMS; MILK PRODUCTION; KEEPING QUALITY

L02 - ANIMAL FEEDING

Effects of Moringa oleifera leaf meal on plasma ghrelin and insulin-like growth factor-1 levels in swine and its potential role in improving sow productivity. **Gonzales, R.K.E.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. rbgonzales5@up.edu.ph., Abina-Artuz, I.R. Department of Agriculture, Provincial Government of Bataan (Philippines). Adiova, C.B., Rayos, A.A., Vega, R.S. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Animal Science.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 279-289. 2019.*

Two experiments were conducted to determine the possible role of Moringa oleifera on sow productivity and ghrelin-growth hormone (GH)/insulin-like growth factor-1 (IGF-1) metabolic pathway. in the first experiment, the effects of 15% M. oleifera leaf meal (MoLM) inclusion in the diet on the plasma ghrelin and IGF-1 levels were determined using four sexually mature gilts with indwelling catheter. Results showed that plasma ghrelin and IGF-1 levels between the control and experimental groups were not statistically different, although pigs fed with MoLM had apparently lower baseline and higher amplitude of plasma ghrelin levels particularly a few hours right after feeding time. on the other hand, IGF-1 level in pigs fed with MoLM seemed down regulated. the second experiment aimed to know the effects of supplementing 15% MoLM on body condition and sow productivity during the week of gradual feed withdrawal prior to farrowing. A total of 16 sows with 141 piglets were used. Although the experimental group registered higher values, the difference in backfat losses from the control group is not statistically significant. The same results were observed for the corresponding piglets; despite higher weaning weight and average daily gain, the control group was not statistically different from the experimental group. The results showed the potential of 15% MoLM in improving sow productivity through ghrelin – GH/IGF-1 metabolic pathway. Further studies are recommended with longer duration of supplementation. These are also recommended to isolate the potential component in MoLM that improves milk production because the high fiber in MoLM possibly contradicts ghrelin release in the stomach.

MORINGA OLEIFERA; LEAF MEAL; SWINE; SOWS; INSULIN-LIKE GROWTH FACTOR; SUPPLEMENTS; FEED ADDITIVES; PRODUCTIVITY; APPETITE

L10 - ANIMAL GENETICS AND BREEDING

Antioxidant and physico-chemical properties and botanical origin of pollen collected by Apis cerana Frabricius from selected apiaries in Laguna and Batangas provinces (Philippines). **Hizon-Fradejas, A.B. abhizonfradejas@up.edu.ph., Dela Torre, L.D.G., Alvarez, P.L.J., Belina-Aldemita, M.D., Micor, J.R.L., Angelia, M.R.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. Barrion-Dupo, A.L.A., Cervancia, C.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences.** *Philippine Entomologist (Philippines). 0048-3753. v. 33 (1) p. 31-47. 2019.*

The physico-chemical and antioxidant properties of the ethanolic extracts of pollen collected by the Asian honey bee, Apis cerana Fabricius, from Laguna and Batangas Provinces (Luzon I., Philippines) were determined. The botanical origin of the bee pollen samples was also identified. The percent mositure ranged from 19.50 ± 0.17 to 22.44 ± 0.13; % of ash, from 2.89 ± 0.02 to 3.58 ± 0.01; % crude fat, from 0.75 ± 0.12 to 2.70 ± 0.09; %

crude fiber, from 1.07 ± 0.16 to 2.76 ± 0.14; % crude protein, from 15.15 ± 0.02 to 20.49 ± 0.95; % total carbohydrates (nitrogen-free extract), from 52.67 ± 0.90 to 56.03 ± 0.09; % sugar, i.e., total sugars, reducing sugar and apparent sucrose, from 9.63 ± 1.35 to 17.30 ± 2.14; from 7.28 ± 3.09 to 14.68 ± 3.50; and from 2.24 ± 2.20 to 2.62 ± 1.54, respectively; phosphorus content, from 1839.7 ± 43.7 to 2062.9 ± 7.5 mg P/kg; and sodium content, from 14.13 ± 0.14 to 33.57 ± 0.91 mg Na/kg. In vitro determination of antioxidant properties of the bee pollen samples includes 2,2-diphenyl-1-picrylhydrazyl (DPPH) Radical Scavenging Capacity with EC50 values of 7.86 ± 0.11 mg/mL to 8.02 ± 0.08, Hydrogen Peroxide Scavenging Capacity with EC50 of 30.86 ± 0.07 to 31.87 ± 0.09 mug/mL and Ferric Ion Reducing Antioxidant Power (FRAP) values of 2.69 ± 0.37 to 3.01 ± 0.49 mmol Fe2+/g extract. All bee pollen samples were multifloral with 19 different pollen types. Variations on the values obtained were attributed to the variation of geographical location and floral sources of the pollen in the samples.

APIS CERANA; APIDAE; HONEY BEES; HIVES; PROXIMATE COMPOSITION; CHEMICOPHYSICAL PROPERTIES; POLLEN; ANTIOXIDANTS; PROVENANCE; BIOGEOGRAPHY; PHILIPPINES

Isozyme and hemocyte analyses of European honey bee (Apis mellifera L.) population reared in agricultural, forested, and industrial areas under different management systems. **Dalawangbayan, K.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Genetics and Molecular Biology Div. Aquino, G.M.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Philippine Genome Center-Program for Agriculture, Livestock, Fisheries, and Forestry. Tandang, R.N., Laude, R.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Genetics and Molecular Biology Div. ritalaude50@gmail.com.** *Philippine Entomologist (Philippines). 0048-3753. v. 33 (1) p. 49-59. 2019.*

Cytological and other genetic differences among European honey bee (Apis mellifera L.) populations reared in agricultural (Calauan), forested (Forestry, Los Baños), and industrial (Canlubang) areas of Laguna [Philippines] determined by hemocyte and isozyme analyses. The diversity among bee samples was assessed before and after transport as the control and experimental groups, respectively. The total hemocyte counts before and after transport were not significantly different among managed honey bee colonies from the tree areas, but significant differences were noted in the unmanaged colonies at six months after transport. The differential hemocyte counts in the control populations (before transport) were significantly different from the experimental group (after transport). The number of prohemocytes were notably increased after transport, especially in the unmanaged colonies from Canlubang. Isozyme analyses revealed that alkaline phosphatase, acid phosphatase, and malic enzyme were all polymorphic among honey bees from all sampled areas. The observed values for genetic distance suggested that all populations remained genetically

similar despite the environmental variation caused by colony transport and the use of different rearing practices.

APIS MELLIFERA; HONEY BEES; SPECIES; APICULTURE; HISTOCYTOLOGICAL ANALYSIS; GENETIC VARIATION; ISOENZYMES; BLOOD CELLS; GENETIC DISTANCE; POPULATION GENETICS; TRANSPORT OF ANIMALS

L20 - ANIMAL ECOLOGY

Guano arthropod assemblages in caves of Mabini, Pangasinan (Philippines). **Encinares, J.M.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. jaencinares@up.edu.ph.** *Philippine Entomologist (Philippines). 0048-3753. v. 33 (1) p. 11-29. 2019.*

This study documented the guano arthropod communities inside Cacupangan, Timori, Santo Rosario and Cabalyorisa Caves in Mabini, Pangasinan [Philippines] in terms of taxonomic composition, density, and distribution within guano deposits. Several types of guano with their unique assemblages of associated arthropods were observed. Even the same type of guano supported different assemblages in different caves. A total of 42 morphospecies belonging to at least six classes were recorded, including three possible new cave-restricted species – a tarantula from Timori Cave (Orphnaecus sp.), and a troglomorphic millipede found in all four caves (Haplodesmidae). Swiftlet guano deposits were found to contain more arthropod taxa than bat guano. It was also found that the abundance of arthropods decreased with guano depth, but taxon richness did not significantly differ with depth.

GUANO; ARTHROPODA; TAXA; EXCRETA; TAXONOMY; CAVES; DENSITY; PHILIPPINES

L40 - ANIMAL STRUCTURE

Spectrochemical analysis of tissues of frog Dryophytes plicatus tadpoles (Amphibia: Hylidae) developing under lead and iron pollution. **Aguillon-Gutierrez, D.R. Universidad Juarez del Estado de Durango, Av. Universidad s/n. Fracc, Filadelfia, C.P. 35010, Gomez Palacio, Durango (Mexico). Facultad de Ciencias Biologicas. Ramirez-Bautista, A. Universidad Autonoma del Estado de Hidalgo, Ciudad del Conocimiento, Carretera Pachuca-Tulacingo km. 4.5, Colonia Carboneras, C.P. 42184, Mineral de la Reforma, Hidalgo (Mexico). Laboratorio de Ecologia de Poblaciones. Romo-Gomez, C. Universidad Autonoma del Estado de Hidalgo, Pachuca, (Mexico). Centro de Investigaciones Qimicas.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 74-81. 2018.*

This study conducted a bioassay on frog tadpoles of the Mexican endemic species Dryophytes plicatus exposed to lead and iron. This species was used because some of its populations live near urban areas that may exposed them to pollutants, such as heavy metals due to industrial processes or mining industry. Specimens in a post-embryonic stage of Dryophytes plicatus were collected in water bodies near El Chico National Park. For the bioassay, the collected samples were grouped into three namely; tadpoles in contact with steel cloves (99% Fe, 1% C); the second group in contact with lead plates; and the last was the control group (without heavy metals). A spectrochemical analysis was held to identify the concentrations of these elements in the liver, intestines, and gills. This study shows that Dryophytes plicatus can bioaccumulate these heavy metals in their tissues, particularly in the liver and the intestine. The concentration of lead and iron was similar in both the control and experimental groups, due to the use of tap water of a mining place, but the concentration in the tadpoles tissues indicates a bioaccumulation process.

FROGS; TISSUE ANALYSIS; LEAD; IRON; BIOASSAYS; WATER POLLUTION; BIOACCUMULATION

L53 - ANIMAL PHYSIOLOGY - REPRODUCTION

Honey or pineapple juice as extender components for Quezon [Philippines] native and Duroc boar semen at different storage temperatures. **Castro, C.H., Dichoso, G.A., Landicho, M.M., Sangel, P.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Animal Science. ppsangel@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (4) p. 322-336. 2020.*

Computer-assisted semen analyzer (CASA) was used to assess the effectiveness of formulated boar semen extenders supplemented with honey and/or pineapple juice. Four boars (i.e., Duroc = 2 and Quezon = 2) served as semen donors, where four ejaculates from each animal were used in this study. Only samples that passed the preliminary quality evaluation were further analyzed and processed. Semen samples were divided and randomly assigned into one of the 11 treatment groups: (T1) a medium-term commercial extender with antibiotics as positive control, (T2) prepared base extender without sugar and antibiotics as negative control (NC), (T3) NC + 0.5% honey, (T4) NC + 1% honey, (T5) NC + 2% honey, (T6) NC + 0.5% pineapple juice, (T7) NC + 1% pineapple juice, (T8) NC + 2% pineapple juice, (T9) NC + 0.5% mixed (1:1) honey and pineapple juice, (T10) NC + 1% mixed honey and pineapple juice, and (T11) NC + 2% mixed honey and pineapple juice and stored at either low temperature (15–20 deg C) or room temperature (22–25 deg C). Results showed that Quezon native and Duroc boar semen diluted with T1 had a semen shelf life of 48 and 52 h, respectively, which is longer compared to those diluted using other treatments. For percentage (%) slow sperm, significantly lower values were seen from using

T5, T6, T7, T9, T10 and T11 than T1 for Quezon boar semen; while T1, T6 and T7 showed significantly lower values than T2 in Duroc boar semen. In terms of sperm morphological parameters, results from all treatments were comparable in Duroc boar semen; while the use of T4 had significantly lower % coiled tail sperm compared to T7 in Quezon boar semen. Room temperature was observed to be more effective in storing diluted semen from Quezon native boars; however, both low and room temperatures were comparable in maintaining diluted Duroc boar semen. Collectively, 0.5% to 2.0% of honey and/or pineapple juice, or its mixture in a 1:1 proportion, are useful and economical substitute ingredients in boar semen extender.

BOARS; ARTIFICIAL INSEMINATION; SEMEN; SEMEN PRESERVATION; HONEY; PINEAPPLE JUICE; INDIGENOUS ORGANISMS; REPRODUCTION; PHILIPPINES

Postpartum clinicopathological and reproductive performance assessment and haptoglobin measurement of dairy cattle with retained fetal membrane. **Nakamura, M. Niigata Prefectural Chuo Livestock Hygiene Service Center, Hataya 686, Nishikan-ku, Niigata-city Niigata, 959-0423 (Japan). masaaki-nakamura@umin.org., Miyamoto, T. National Inst. of Animal Health, NARO, 3-1-1 Kannondai, Tsukuba, Ibaraki 305-0856 (Japan). Camer, G.A. University of Eastern Philippines Northern Samar 6400 (Philippines). Coll. of Veterinary Medicine. Koyama, T. Hokkaido Research Organization, Shintoku, Hokkaido 081-0038 (Japan). Animal Biotechnology Group, Animal Research Center. Matsui, Y. Hokkaido Research Organization, 7 Asahigaoko, Nakashibetsu-cho, Shibetsu-gun, Hokkaido 081-0038 (Japan). Dairy Cattle Research Unit. Sugiura, T., Moriyoshi, M., Nakada, K. Rakuno Gakuen Univ., Ebetsu City, Hokkaido 069-8501 (Japan). Dept. of Large Animal Clinical Sciences. Sawamukai, Y. Yokoo Domestic Animal Clinic, 2038-2 Sekiya, Nasushiobra City, Tochigi, 329-2801 (Japan).** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 235-244. 2020.*

Cattle with retained fetal membrane (RFM) interrupt optimal dairy productivity including reproductive performance. In this 28-mo duration experimental study, several clinical tests (observation of morbid clinical signs, rectal temperature, vaginal discharge scoring, and blood inflammatory marker measurements) were completed in 19 cattle with RFM including 8 cattle with normally expelled fetal membrane. Twelve out of 19 cattle showed morbid clinical signs at 2.2 ± 1.3 days postpartum (dpp) and pyrexia at 2.3 ± 1.7 dpp. All cattle with RFM had vaginal discharge scores of 1-3 (4-point scale) that steadily persisted for 2-8 wk postpartum. Lower conception rates were noted in cattle with RFM than in cattle with no RFM (64% vs. 100%). Blood haptoglobin (Hp) levels of cattle with RFM and with morbid clinical signs were consistently elevated from 1-10 d (all $P < 0.01$). The Hp of test cattle for 3 d correlated with the 'days open' ($Rs = 0.47$). These findings have in effect validated the value of using Hp in assessing cattle with RFM. In addition to using Hp, regular

clinical and laboratory tests as described herein should be integrated in the management of cattle with RFM.

DAIRY CATTLE; FOETAL MEMBRANES; PLACENTAL RETENTION; PERINATAL PERIOD; REPRODUCTIVE PERFORMANCE; PARTURITION; SEXUAL REPRODUCTION; ENDOMETRITIS; UTERINE DISEASES; LABORATORY ANIMALS; LABORATORY EXPERIMENTATION

L60 - ANIMAL TAXONOMY AND GEOGRAPHY

Genotypic diversity of Escherichia coli isolates in Philippine native swine from Quezon Province, Philippines as revealed by Enterobacterial Repetitive Intergenic Consensus (ERIC)-PCR. **Vigo-Prutscher, C.M.E., Balcera, J.B.L., Opulencia, R.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Microbiology Div. rbopulencia@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 146-153. 2020.*

The Philippine native swine (PNS) is an economically important livestock in Quezon Province [Philippines] and recognized as more disease-resistant than the white crossbreeds or hybrids. This study was conducted to determine the genotypic diversity of the Escherichia coli population in the intestine of PNS and to identify factors that might have influenced E. coli dissemination in PNS. E. coli were isolated from the intestinal tract of 76 PNS and from 38 soil and water samples from 20 farms in seven municipalities in Quezon Province and analyzed by enterobacterial repetitive intergenic consensus (ERIC)-PCR. Results revealed extensive genotypic diversity in 114 E. coli isolates from PNS from various farms. However, genotypic diversity was not strictly correlated with municipality or geographical origin of the isolate or PNS, phenotypic traits of swine, and swine farm management practices. These results suggest that the population of E. coli in gut of PNS is dynamic and members of the population might have been derived from various sources. The diversity might have been influenced by multiple factors, including swine and farm management practices.

SWINE; SPECIES; ESCHERICHIA COLI; INDIGENOUS ORGANISMS; PATHOGENS; PESTS OF ANIMALS; BACTERIOSES; PHILIPPINES

L70 - VETERINARY SCIENCE AND HYGIENE - GENERAL ASPECTS

In search of balanced anesthesia: analyzing the effects of various injectible drug combinations in selected domestic animals. **Abalos, J.H.A. Philippines Univ. Los Banos, College, Laguna (Philippines). Dept. of Veterinary Clinical Sciences.** UPLB Centennial Professorial Chair Lecture. College, Laguna (Philippines). 20 Jul 2020.

The lecture explored the use of balanced anesthesia in veterinary practice. The basic principles of anesthesis and background on studies on the use of tietamine-zolazepam for balanced anesthesia in both domestic and wild animals is first discussed. The results of several studies local done on anesthetic combinations in three domestic animal species focusing on the duration of various phases of anesthesia, the cardiorespiratory effects of these anesthetic combinations, and their effects on the electrocardiogram where then analyzed in detail. The base anesthethic used was tiletamine-zolazepam since this has susperseded ketamine as the anesthetic of choice in domstic animals is with the classification of ketamine as a schedule 2 regulated drug . Studies in cats have shown that the addition of xylazine significantly prolongs the effect of tiletamine-zolazepam but the addition of ketamine to tiletamine and xylazine also resulted in significant depression of the heart rate, respiratory rate and temperature. Higher doses of tiletamine-zolazepam when combined with zylazine also resulted to a greater degree of depression of the heart rate, respiratory rate and temperature. Higher doses of tiletamine-zolazepam when combined with zylazine also resulted to a greater degree of depression of vital signs. However, the use of propofol maybe a better anesthetic combination although respiratory rates and temperature also dipped with this combination. The Sp02 levels tended to remain abov 90 on average in all the combinations used suggesting adequate tissue oxygenation. In dogs, tiletamine-zolazepam alone tends to result to a 'stormy' recovery since tiletamine is metabilized more slowly than zolaszepam. Thus, it is important to produce a balanced anesthesia that would result to smoother recoveries. Romifidine has been shown to prolong the duration of tiletamine-zolazepam anesthesia although it is also resulted in depression of vital signs except when only half the recommended dose of tiletamine-zolazepam is used. ECG abnormalities when only half the recommended dose of tiletamine-zolazepam is used. ECG abnormalities were also observed. In goat, tiletamine-zolaspam alone did not result to the production of anelgesia. Combining tiletamine-zolazepam with xykazine has been shown to result in decreased cortisol levels 30 minutes after administration which is interpreted to mean that there is an adequate pain relief. However, the decrease is cortisol level is significantly lower when ketamine-xylazine combination is used leading one to concluded that this combination produces better antinociception. Although xylazine does prolong the duration of action tiletamine-zolazepam and ketamine, this also results to prolonged recovery times. Cardiorespiratory depression is also present and there is a tendency towards the production of arrhythmias.

CATS; DOGS; GOATS; ANAESTHESIA; DRUGS

L72 - PESTS OF ANIMALS

Genotypic diversity of Escherichia coli isolates in Philippine native swine from Quezon Province, Philippines as revealed by Enterobacterial Repetitive Intergenic Consensus (ERIC)-

PCR. **Vigo-Prutscher, C.M.E., Balcera, J.B.L., Opulencia, R.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Microbiology Div. rbopulencia@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 146-153. 2020.*

The Philippine native swine (PNS) is an economically important livestock in Quezon Province [Philippines] and recognized as more disease-resistant than the white crossbreeds or hybrids. This study was conducted to determine the genotypic diversity of the Escherichia coli population in the intestine of PNS and to identify factors that might have influenced E. coli dissemination in PNS. E. coli were isolated from the intestinal tract of 76 PNS and from 38 soil and water samples from 20 farms in seven municipalities in Quezon Province and analyzed by enterobacterial repetitive intergenic consensus (ERIC)-PCR. Results revealed extensive genotypic diversity in 114 E. coli isolates from PNS from various farms. However, genotypic diversity was not strictly correlated with municipality or geographical origin of the isolate or PNS, phenotypic traits of swine, and swine farm management practices. These results suggest that the population of E. coli in gut of PNS is dynamic and members of the population might have been derived from various sources. The diversity might have been influenced by multiple factors, including swine and farm management practices.

SWINE; SPECIES; ESCHERICHIA COLI; INDIGENOUS ORGANISMS; PATHOGENS; PESTS OF ANIMALS; BACTERIOSES; PHILIPPINES

L73 - ANIMAL DISEASES

Genotypic diversity of Escherichia coli isolates in Philippine native swine from Quezon Province, Philippines as revealed by Enterobacterial Repetitive Intergenic Consensus (ERIC)-PCR. **Vigo-Prutscher, C.M.E., Balcera, J.B.L., Opulencia, R.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Microbiology Div. rbopulencia@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 146-153. 2020.*

The Philippine native swine (PNS) is an economically important livestock in Quezon Province [Philippines] and recognized as more disease-resistant than the white crossbreeds or hybrids. This study was conducted to determine the genotypic diversity of the Escherichia coli population in the intestine of PNS and to identify factors that might have influenced E. coli dissemination in PNS. E. coli were isolated from the intestinal tract of 76 PNS and from 38 soil and water samples from 20 farms in seven municipalities in Quezon Province and analyzed by enterobacterial repetitive intergenic consensus (ERIC)-PCR. Results revealed extensive genotypic diversity in 114 E. coli isolates from PNS from various farms. However, genotypic diversity was not strictly correlated with municipality or geographical origin of

the isolate or PNS, phenotypic traits of swine, and swine farm management practices. These results suggest that the population of E. coli in gut of PNS is dynamic and members of the population might have been derived from various sources. The diversity might have been influenced by multiple factors, including swine and farm management practices.

SWINE; SPECIES; ESCHERICHIA COLI; INDIGENOUS ORGANISMS; PATHOGENS; PESTS OF ANIMALS; BACTERIOSES; PHILIPPINES

Postpartum clinicopathological and reproductive performance assessment and haptoglobin measurement of dairy cattle with retained fetal membrane. **Nakamura, M. Niigata Prefectural Chuo Livestock Hygiene Service Center, Hataya 686, Nishikan-ku, Niigata-city Niigata, 959-0423 (Japan). masaaki-nakamura@umin.org., Miyamoto, T. National Inst. of Animal Health, NARO, 3-1-1 Kannondai, Tsukuba, Ibaraki 305-0856 (Japan). Camer, G.A. University of Eastern Philippines Northern Samar 6400 (Philippines). Coll. of Veterinary Medicine. Koyama, T. Hokkaido Research Organization, Shintoku, Hokkaido 081-0038 (Japan). Animal Biotechnology Group, Animal Research Center. Matsui, Y. Hokkaido Research Organization, 7 Asahigaoko, Nakashibetsu-cho, Shibetsu-gun, Hokkaido 081-0038 (Japan). Dairy Cattle Research Unit. Sugiura, T., Moriyoshi, M., Nakada, K. Rakuno Gakuen Univ., Ebetsu City, Hokkaido 069-8501 (Japan). Dept. of Large Animal Clinical Sciences. Sawamukai, Y. Yokoo Domestic Animal Clinic, 2038-2 Sekiya, Nasushiobra City, Tochigi, 329-2801 (Japan).** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 235-244. 2020.*

Cattle with retained fetal membrane (RFM) interrupt optimal dairy productivity including reproductive performance. In this 28-mo duration experimental study, several clinical tests (observation of morbid clinical signs, rectal temperature, vaginal discharge scoring, and blood inflammatory marker measurements) were completed in 19 cattle with RFM including 8 cattle with normally expelled fetal membrane. Twelve out of 19 cattle showed morbid clinical signs at 2.2 ± 1.3 days postpartum (dpp) and pyrexia at 2.3 ± 1.7 dpp. All cattle with RFM had vaginal discharge scores of 1-3 (4-point scale) that steadily persisted for 2-8 wk postpartum. Lower conception rates were noted in cattle with RFM than in cattle with no RFM (64% vs. 100%). Blood haptoglobin (Hp) levels of cattle with RFM and with morbid clinical signs were consistently elevated from 1-10 d (all $P < 0.01$). The Hp of test cattle for 3 d correlated with the 'days open' ($Rs = 0.47$). These findings have in effect validated the value of using Hp in assessing cattle with RFM. In addition to using Hp, regular clinical and laboratory tests as described herein should be integrated in the management of cattle with RFM.

DAIRY CATTLE; FOETAL MEMBRANES; PLACENTAL RETENTION; PERINATAL PERIOD; REPRODUCTIVE PERFORMANCE; PARTURITION; SEXUAL REPRODUCTION; ENDOMETRITIS; UTERINE DISEASES; LABORATORY ANIMALS; LABORATORY EXPERIMENTATION

M - FISHERIES AND AQUACULTURE

M01 - FISHERIES AND AQUACULTURE - GENERAL ASPECTS

One size does not fit all: marine scientists say most parrotfish sold in the markets aren't endangered and that misinformation and misplaced conservation endangers fisherfolk. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 60-63. 2021.*
https://agriculture.com.ph/2021/03/14/one-size-does-not-fit-all-marine-scientists-say-most-parrotfishes-sold-in-the-markets-arent-endangered-and-that-misinformation-and-misplaced-conservation-endangers-fisherfolk/

FISHES; FISHERY MANAGEMENT; FISHERY RESOURCES; RESOURCE CONSERVATION; ENDANGERED SPECIES

M11 - FISHERIES PRODUCTION

Integrated adaptation management approach toward sustained fish production by fish farmers of Marilao-Meycauayan-Obando River System [Philippines]. **Malenab, Ma.C.T. mtmalenab@up.edu.ph., Visco, E.S. esvisco@up.edu.ph., Amparo, J.M.S. jmsamparo@up.edu.ph., Mendoza, M.D. Philippines Univ. Los Baños, College, Laguna (Philippines). mdmendoza2@up.edu.ph., Atole, M.R.J.T. Blacksmith Inst. (Philippines). atole@dap.edu.ph.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 15 (1) p. 61-73. 2018.*
https://ajad.searca.org/article?p=551

This study was conducted to profile the fish farm owners/operators (known as fish farmers) at the Marilao-Meycauayan-Obando River System (MMORS) and to determine their current fish farm management practices (FFMPs) and concerns encountered in fish farming. Characterizing the fish farmers enabled the formulation of appropriate adaptation interventions that may serve as inputs for management strategies and rehabilitation efforts to address water pollution. In doing so, sustainable fish production could be assured. Focus group discussions, key informant interviews, and a survey were conducted. The survey sampling size was proportionally allocated among municipalities covered in this study. Half of the respondents were full-time fish farmers and received an estimated monthly income of USD 125–250. The majority (60%) managed small ponds (4 ha and below), which were used for rearing and nursery or rearing and transition of fingerlings or fry. Many rented fish

farms through lease agreement with private owners (78%); they mostly grew milkfish (74%) and tilapia (41%), but a few also raised prawns (18%) and shrimps (12%). The fish farmers' major issues include flooding due to changing climate patterns (74), water pollution (21), and presence of invasive species (20). Their adaptation strategies include technological changes including FFMPs. However, institutional arrangements are crucial to ensure sustainability and productivity. The study recommends the adoption of an integrated social-technological approach called CARE solution, which refer to Community Action by organizing the fishery sector; long-term Rehabilitation by integrating efforts of all stakeholders through the MMO Water Quality Management Area Board; and Enforcement of environmental laws. This approach is congruent with the Ecosystem Approach for Aquaculture that integrates ecosystem, human well-being and equity, and incorporates other sectors for aquaculture development and management. The fish farm management baseline study results could be an input in developing specific interventions using the CARE solution framework in the MMORS cleanup and rehabilitation. This approach could help in the design of interventions that aim to achieve enhanced socio-ecological health and ecosystem services for improved and sustained socioeconomic productivity.

FISHES; FISHERY PRODUCTION; FISHERMEN; ADAPTATION; SUSTAINABILITY; RIVERS; RESOURCE MANAGEMENT; WATER POLLUTION; PHILIPPINES

M12 - AQUACULTURE PRODUCTION

OFW's [overseas Filipino workers] aquaculture farm harvest 5,000 kilos of catfish sells it at P[hp]45 per kilo. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 28-30. 2021.*
https://agriculture.com.ph/2021/01/11/ofws-aquaculture-farm-harvests-5000-kilos-of-catfish-sells-it-at-p115-per-kilo/

MARINE CATFISH; TILAPIA; AQUACULTURE; MARKETS; YIELDS

Technical efficiency and social capital in tilapia aquaculture production in Nueva Vizcaya, Philippines. **Jandoc, A.M. Nueva Viscaya State Univ., Bayombong, Nueva Viscaya (Philippines). aljanetjandoc@yahoo.com.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 16 (2) p. 73-96. 2019.*
https://ajad.searca.org/article?p=881

This paper focuses on tilapia aquaculture production in Nueva Vizcaya, Philippines. Primary data were collected from a field survey. Apart from investigating the effects of technical efficiency variables (e.g., operator's experience, age of fishpond owner, and frequency of visits of the manager) on the production frontier, this study also incorporated social capital

variables (e.g., social network and trust) as additional factors affecting the frontier. A cross-sectional analysis of 202 fishpond operators from the 10 municipalities in the province was conducted using stochastic frontier analysis, where the error component consists of both the usual two-side random shocks and the one-side technical inefficiency shocks. Results suggest that social network has an indirect but significant relationship to aquaculture harvest. On the other hand, harvest is significantly influenced by community trustworthiness, which implies that fish farmers who do not readily lend money to members of their community are able to increase their harvest because they can devote their funds to production activities.

TILAPIA; AQUACULTURE; EFFICIENCY; CAPITAL; ECONOMIC ANALYSIS; MATHEMATICAL MODELS; PHILIPPINES

M40 - AQUATIC ECOLOGY

Fluctuating asymmetry and acetylcholinesterase activity in tank goby (Glossogobius giuris) (Hamilton 1822) as indicators of environmental stress in the East Bay of Laguna de Bay, Philippines. **Fajardo, L.J. Central Luzon State Univ., Nueva Ecija (Philippines). Coll. of Fisheries. lorenzfajardo@clsu.edu.ph., Camacho, M.V.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences.** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 29 (2) p. 1-21. 2019.*
https://erdb.denr.gov.ph/2020/05/01/sylvatrop-volume-29-no-2-july-to-december-2019/

Fluctuating asymmetry (FA), the subtle random deviation between left and right sides of bilaterally symmetrical organism, and inhibition of acetycholinesterase (AChE) activity are widely reported as potential early-warning tools in monitoring the health of aquatic ecosystems. This study investigated asymmetry in body shape and AChE in tank goby, Glossogobius giuris, a native and commercially important fish of dwindling stocks in Laguna de Bay, Philippines. Wild fish populations from predominantly agricultural sites in Bay and Santa Cruz, in the East Bay of Laguna de Bay, were compared to a reference population, reared in concrete tanks. Landmark-based geometric morphometrics via Symmetry and Asymmetry in Geometric Data and Procrutes Analysis of Variance revealed significant levels of both directional and fluctuating asymmetries among populations. High F values of FA imply that deviations from perfect symmetry are attributed to environmental stress. Principal component analysis for FA showed notable deformations and higher overall variation in wild populations. Moreover, rapid colorimetric method determined significantly lower brain and muscle AChE activities in wild populations. AChE Inhibition rates are indicative of fish exposure to anticholinesterase pesticides in the agricultural sites. Findings

may indicate the presence of environmental stress associated with anthropogenic pressures in East Bay which manifested in the morphology and physiology of tank goby.

GLOSSOGOBIUS GIURIS; ACETYLCHOLINESTERASE; ENVIRONMENTAL MONITORING; EARLY WARNING SYSTEMS; MONITORING; PESTICIDES; AQUATIC ENVIRONMENT; PHILIPPINES

N - AGRICULTURAL MACHINERY AND ENGINEERING

N20 - AGRICULTURAL MACHINERY AND EQUIPMENT

Bulk peanut shell behavior under static loads and the associated physico-mechanical properties. **Ugurluay, S. Hatay Mustafa Kemal Univ., Hatay (Turkey). Faculty of Agriculture. ugurluay@mku.edu.tr., Akcali, I.D. Cukurova Univ., Adana (Turkey). Faculty of Engineering and Architecture, Mechanical Engineering Dept.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 262-269. 2019.*

In order for the peanut shell waste to have an economic value, it should be processed mechanically. Among others, for instance, utilization of peanut shell as a fuel source or insulation material requires them to be compressed. Thus, for a rational design of such machinery, there is a need to know the behavior of peanut shells under compressive static loads and the associated physico mechanical properties. To those ends experiments were carried out, using the local Turkish cultivars Osmaniye, Silifke, Anamur and Antalya. Mathematical models for force-deformation, pressure-strain and pressure-density relationships were obtained from the test data. Linear and non-linear behaviors in the first, third and second regions of the test domain were determined, respectively. Limiting values of pressure, density, stiffness, bulk moduli, compression ratio and compression energy per volume were estimated. For the cultivars tested, stiffness values varied between 19.7 and 52.6 N /mm in the first region, between 12402.0 and 5111.2 N/mm in the third region. Bulk moduli ranged from 0.184 to 0.471 N mm-2 in the first region, and from 46.886 to 110.182 N mm sq in the third region. Compression energy per volume and compression ratio were found between 0.1976 and 0.2916 N mm.mm cu, and between 4.0 and 4.4 respectively.

GROUNDNUTS; KERNELS; SHELL; EQUIPMENT; ENERGY RESOURCES; CHEMICOPHYSICAL PROPERTIES; MECHANICAL PROPERTIES; PRESSING; PRESSURE EXTRACTION; FUEL CROPS; BRIQUETTES

Eagle [Drones] has landed. **Barcelona, A.T.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 10; 12-13. 2021.*

EQUIPMENT; MONITORING; FARM SURVEYS; SPRAYING; SOWING; GEOGRAPHICAL INFORMATION SYSTEMS; DATA COLLECTION

Efficiency and efficacy of multi-purpose precision drone spreader in nutrient application of rice production. **Collado, W.B., Caballong, N.L. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Crop Protection Div. Tan, A., Barroga, R., Bermudez, R.V. Jr., Cañete, S.D., Orcino, J.A. New Hope Corporation, Ma-a Davao City (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 172. 2019.*

Efficient fertilizer application ensures equal distribution and full absorption of nutrients by the rice crop. Manual broadcasting is the most common method of applying granular fertilizers in the rice fields in the Philippines. Meanwhile, a hexa-copter agricultural precision drone that can broadcast dry materials of a diameter between 0.5mm to 5mm such as granular fertilizers, seeds, and feeds is starting to gain access to the local farming market. With a load capacity of 10kg, the system has automated mission feature wherein users can plot out the area and it automatically creates and follows flight path. The drone is also capable of resuming its mission path after refilling should it emptied its tank load at midflight. The potential of this technology in nutrient application in rice has not been explored. Thus, a study under the field condition at PhilRice CES from January to May 2019 was conducted to test and compare the efficiency and effectiveness of the precision drone spreader technology with manual method in applying granular fertilizer in rice. Cutting the recommended nutrient rate into two splits, granular fertilizers were applied in two plots through the following treatments: manual broadcast and drone spreading. Crop cut and actual yield data as well as the time spent during the application were recorded and analyzed. Results showed that the drone-spread plot has more equal distribution of nutrients based on crop cut compared to the manually broadcasted. Drone-spread plot harvest data was higher compared to the manually broadcasted plot both in the crop cut and actual yield. In terms of the duration of the fertilizer application, both are relatively equal. The results suggests that multi-purpose precision drone spreader has the same efficiency and is more effective than manual fertilizer broadcasting. This experiment will be continued in the next seasons under more rigorous design.

ORYZA SATIVA; FERTILIZER APPLICATION; APPLICATION RATES; TECHNOLOGY; TECHNOLOGY TRANSFER; EQUIPMENT

Rice grown by drone demonstration. **Barroga, R.F. Philippine Rice Research Inst., Mali gaya, Science City of Muñoz, Nueva Ecija (Philippines). Tan, A. New Hope Corporation,**

Ma-a Davao City (Philippines). Caballong, N.L., Alday, P.A.A., Dicon , E.M. III. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 164. 2019.*

Rice production in the Philippines has improved significantly since the 1950s. The use of better quality seeds, new farming methods and information, mechanization, and modernization has positively affected rice crop yield and has reduced cost of production. Rice agriculture continue to improve, employing more advanced technologies such as drones. A model of drone technology is composed of a remotely-controlled intelligent hexa-copter aircraft and detachable sprayer and spreader components with the load capacity of 10li and 10kg, respectively. The system has automated mission feature wherein users can plot out the area to hover and it automatically creates and follows a flight path. The drone is also capable of resuming its mission path after refilling should it emptied its tank load at midflight. To pilot-use and simulate a rice production wherein an agricultural drones are fully integrated in the crop established, fertilizer application, and weeds management processes, a 1,391 sqm demonstration plot was established in dry season 2019 at PhilRice CES, Nueva Ecija. In the crop establishment phase, a precision drone spreader was used to broadcast pre-germinated NSIC Rc 402 at 20kg/ha seeding rate. Farmers usually use 40-80kg/ha of seeds. After two days, it was followed by the application of pre-emergence herbicide using 160l/ha water dilution ratio. For the fertilizer application, the precision drone spreader was again used. The recommended 120-60-60/ha nutrient rate at the area was employed in this phase in two-split distribution. By the end of the season, the actual yield data was recorded. Results showed that the variety used reached its 5.0t/ha average yield for direct seeding. This suggests that it is possible to produce rice with the use of agricultural drones.

ORYZA SATIVA; VARIETIES; PLANT ESTABLISHMENT; INNOVATION ADOPTION; AUTOMATION; EQUIPMENT; COMPUTER APPLICATIONS

Use of multi-purpose seeder: an innovation to improve farm sustainability in rainfed lowlands. **Corales, A.M. am.corales@philrice.gov.ph., Santos, R.C., Abon, J.E.O., Bautista, E.G., Dingle, E.L., Suralta, R.R., Basuel, E., Peralta, L.C., Martin, E.C. Philippine Rice Research Inst. Central Experiment Station, Maligaya, Muñoz, Nueva Ecija (Philippines). Bueno, C.S., Banayo, N.C. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Marine Genomics and Molecular Genetics Lab. Kato, Y. University of Tokyo, Nishitokyo (Japan).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City

(Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 179. 2019.*

Rice farmers in rainfed environments are faced with unpredictable rainfall patterns and high production cost. Dry direct-seeded rice (DDSR) is a potential crop establishment alternative to transplanted rice to cope with water shortage and increasing cost of production. Dry direct seeding using a mechanical row seeder in contrast to manual seeding enables rice seeds to be planted at proper soil depth and with even distribution resulting in uniform and stable crop stand. However, most of the currently used types of mechanical seeders for rice have their own strong and weak points. A seeder to mechanize seeding of rice and which could also be utilized for seeding cash crops would be of great help in reducing the cost of production especially of farmers in rainfed lowlands. On-farm verification trails conducted in Regions 1, 2, 3, 6 and 12 revealed that in using a multi-purpose seeder for DDSR, the seeds and labor costs in wet season 2017 and 2018 were significantly reduced by 55% and 56% respectively. Total production cost was 8% or Php 7,212.00 lower when using the multi-purpose seeder compared to farmer's practice this contributing to an additional income of Php 11,316/ha. Results suggest that the use of a multi-purpose seeder could contribute in improving the livelihood of farmers thereby improving farm sustainability in areas prone to drought.

ORYZA SATIVA; RICE; DIRECT SOWING; EQUIPMENT; PLANT ESTABLISHMENT; RAINFED FARMING; LOWLAND

P - NATURAL RESOURCES AND ENVIRONMENT

P01 - NATURE CONSERVATION AND LAND RESOURCES

108 orchid species found in Mt. Busa, Southern Mindanao [Philippines]. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p.56-57. 2021.*
https://agriculture.com.ph/2021/04/25/108-orchid-species-found-on-mt-busa-southern-mindanao/

ORCHIDACEAE; SPECIES; ORNAMENTAL PLANTS; BIODIVERSITY; FLORA; RESOURCE CONSERVATION; HIGHLANDS; PHILIPPINES

Analysis of multi-level Collaborative Management System in Mount Kitanglad Range Natural Park, Mindanao, Philippines. **Parr, J. Ministry of Natural Resources and Environment, Vientiane, Khour Boulum Road, Thong Khankham Village, Chantaboul District (Lao, P.D.R.). Dept of Forest Resource Management. rwkparr103@gmail.com.** *Ecosystem and Development Journal (Philippines). 2012-3612. v. 7 (1) p. 33-40. 2017.*

The overwhelming majority of government-designated protected areas in Asia have been thwarted with constraints to become effectively and equitably managed, and integrated into the boarder landscapes. Significant constraints have included legal, governance, institutional, management capacities and financial aspects. In sharp contrast, the Philippines has over three decades of experience tackling the institutional mechanics of collaborative management. This paper analyses the management arrangement of Mount Kitanglad Range Natural Park (MKRNP), one of the country's best collaboratively managed protected areas. The analysis reveals a multi-level collaborative management bodies, 13 protected area management working groups and the resurrection of local indigenous institutional bodies - the Council of Elders and the tribal guards. Some protected area working groups are effective whilst a few working groups have broad, and sometimes overlapping, mandates. Of high concern, both the landscape collaborative management bodies have low representation of these working groups and the indigenous communities themselves. Protected area staffing levels and resources are inadequate for providing technical support to effective multi-level collaborative management. Overall, MKRNP represents an interesting example of multi-level collaborative management for protected areas and adjacent buffer zones - and generating positive attitudes and behavioral change. Recommendations are made regarding strengthening protected area management towards achieving Aichi Target 2.

PROTECTED FORESTS; NATURE RESERVES; RESOURCE MANAGEMENT; PHILIPPINES

Comparison of contingent valuation and travel cost method in estimating the recreational values of a forest park in Iran. **Amirnejad, H., Jahanifar, K., Sari Agricultural Sciences, and Natural Resources Univ., Sari (Iran).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 36-44. 2018.*

Today, countries that focus more on economic development considers the tourism industry as a major contributor to it. As one of the major field of tourism, ecotourism is seriously promoted. Estimating monetary value of environmental resources of ecosystem function is a method for understanding if the investments for conservation, improvement or revival of the environmental resources earned social welfare improvements. In this study, the recreational value of Bamo National Park (BNP) was estimated and measured using two methods of Contingent Value Method (CVM) and Travel Cost Method (TCM). The variables, inhabitance, distance from park, first visit, number of visit, deontologist, education, travel cost, visitors income, museum existence and existence of animal species were the effective variables on willingness to pay (WTP) of visitors in 2015. Monthly expected willingness to pay of Consequentialist and Deontologist visitors was US$ 2.08 and 2.47, respectively. Finally, the recreational value of Bamu Park, which were estimated in two methods was

equivalent US$ 43940.47 and 79959.25, respectively, in 2015. The travel cost method used the market price information and it revealed there is willingness to pay and 90.7% of visitors have zone inhabitance. Further, travel cost function was ideal for the econometrics theoretical aspect and preferred using the travel cost method instead of contingent value method to valuating the Bamo National Park.

RECREATIONAL AREAS; ECONOMIC DEVELOPMENT; TOURISM; RESOURCE MANAGEMENT; NATURE RESERVES; IRAN ISLAMIC REPUBLIC

GALENG [Grassroots Advocacy, Livelihoods, Environment, Networking and Governance] strategy: an innovative approach to sustainable natural resources management. **Lapitan, R.L. Philippines Univ. Los Banos, College, Laguna (Philippines). Inst. of Renewable Natural Resources. rllapitan@up.edu.ph.** UPLB Centennial Professorial Chair Lecture. Via online (Zoom meeting platform). 29 Sep 2021.

The author believed that when the author treat the physical environment as part of the community then sees the community as part of the landscape. Recognizing the independence of community well-being and strengthening the capacity of communities to have a voice in decisions about planning and design conservation initiatives affecting them. Grassroots communities have made enormous contributions to the maintenance of some of most fragile ecosystems. Through years of work experience, this author knows that conservative approaches designed with communities and indigenous people can help mitigate any negative social impacts while providing lasting incentives-benefits-for sustainable management of natural resources. Hence, this GALENG strategy. The GALENG strategy does not claim to be a new approach to the development .GALENG which stands for Grassroots Advocacy, Livelihoods, Environment, Networking and Governance comprises a set of principles, backed up with a set of tools; the plural approaches is used deliberately to indicate that there is no single way forward that might conflict with other development approaches. The evaluation of GALENG has been a self-conscious process with much arising from this author's number of exposure and experiences in developing comprehensive management plans towards an improved understanding and targeting of development problems. The GALENG strategy illustrates a learning loop that literates action planning and implementation with a feedback mechanism. This framework process reinforces local ownership, knowledge and priorities by participatory knowledge, gap identification, and where results are fed back into the community development process. GALENG as an approach provides a platform for diverse stakeholders, interests and views to be openly negotiated toward more socially-optimal solutions. It enables identification of opportunities missed due to poor communication among stakeholders, a prior structuring of development processes by outside actors, or lack of institutional collaboration and a synergy (i.e. policy and technology). Through GALENG approach erroneous assumptions and prejudices about

reality were identified and impetus of creating opportunities for innovation and enabling participatory monitoring and adaptive management of change is ensured. Further, it opened up change processes beyond those envisioned by government agencies (often biased toward technical solutions), which tends to introduce governance and policy challenges and ensure their solution.

NATURAL RESOURCES; ETHNIC GROUPS; INDIGENOUS ORGANISMS; ENVIRONMENTAL IMPACT ASSESSMENT; LANDSCAPE; ECOSYSTEMS; GOVERNANCE; POLICIES

Mt. Busa [Southern Mindanao, Philippines] an area that needs to be protected. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 58-59. 2021.*
https://agriculture.com.ph/2021/04/25/mt-busa-an-area-that-needs-to-be-protected/

HIGHLANDS; VIRGIN FORESTS; BIODIVERSITY; RESOURCE CONSERVATION; PHILIPPINES

P05 - ENERGY RESOURCES MANAGEMENT

Parametric study on the effect of congeners on molecular sieve dusting during ethanol dehydration. **Pector. A.A., aapector@up.edu.ph., amabelle.pector@gmail.com., Movillon, J.L., Bataller, B.G., Baticados, E.J.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue No. 7 p. 12-19. 2017.*

Sieve dusting reduces the efficiency of molecular sieve adsorption during ethanol dehydration. As a result, the recoverable yield of pure ethanol is lowered. This study explored the contribution of congeners (acetone, ethyl acetate, and methanol) in molecular sieve dusting by varying the number of pressure cycles and congener concentrations during ethanol dehydration. A general two-factorial design with three levels was used to statistically test these factors. Degree of dusting was evaluated by measuring cumulative decrease in mass and change in crush strength of sieves. The number of pressure cycles and congener concentration had a positive effect on the decrease in mass of Type 3A molecular sieves and a negative effect with crush strength. There was an 11.20 %, 18.56 %, and 34.11 % change in crushing strength from 400, 800, and 1200 mg/L acetone concentration for a five-cycle dehydration run, respectively. Greatest decrease in bulk mass was found to be 0.53% (cumulative) and 0.25% (non-cumulative) for acetone and 0.60% (cumulative) and 0.31% (non-cumulative) for congener mixture. The parameters had no significant interaction towards each other; thus, the effect of the number of pressure cycle and congener concentration was additive to sieve dusting.

ETHANOL; DEHYDRATION; SEPARATORS; DUSTING

Sweet sorghum juice and syrup production using conventional sugarcane mill and evaporator. **Demafelis, R.B. rbdemafelis@up.edu.ph., rbdema@yahoo.com., Gatdula, K.M., Malabuyoc, J.A.S., Baticados, E.J.N. Philippines Univ. Los Baños, College Laguna (Philippines). Chemical Engineering Dept.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue No. 7 p. 40-47. 2017.*

In light of heightened discussions regarding food vs. fuel issue, different feedstocks have emerged to compromise in meeting the desired volumetric requirement of bioethanol in the country. Sweet sorghum is considered as one of the promising feedstocks taking into account its remarkable characteristics such as shorter crop duration, less water and fertilizer requirement and its compatibility in terms of planting in idle lands. This study focused on the prospect of producing sweet sorghum juice and syrup using conventional sugarcane mills and evaporators. Parameters vital in juice extraction and evaporation sections have been determined to assess its qualities and compared with that of sugarcane. For the milling station, the first expressed juice obtained a Polarity of 6.54 %, apparent purity of 50.97 % and 12.83 deg Brix. For the mixed juice, same parameters were determined (Polarity of 4.76%, apparent purity of 46.21%, Brix of 10.26 deg). Lastly, the bagasse contained 1.66% Pol, 50.11% moisture and 48.23% fiber. Pol extraction was also calculated as 88.29%. In terms of syrup production, a Brix of 65 deg and Polarity of 50.05% were achieved. To assess the performance of the evaporators, % evaporation was computed and a value of 83.87% was obtained.

SORGHUM BICOLOR; PLANT PRODUCTS; BIOFUELS; EQUIPMENT; EVAPORATION; EXTRACTION

P06 - RENEWABLE ENERGY RESOURCES

Carbon emission inventory of a commercial-scale Jatropha (Jatropha curcas L.) biodiesel processing plant. **Obligado, A.B. Department of Agriculture 2nd Floor BSWM Bldg. Elliptical Rd., Diliman, Quezon City (Philippines). Technology Commercialization Div. abobligado2@yahoo.com., Demafelis, R.B., Matanguihan, A.E.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering. Villancio, V.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Agriculture and Food Science. Magadia, R.V. Jr. Department of Agriculture 2nd Floor BSWM Bldg. Elliptical Rd., Diliman, Quezon City (Philippines). Technology Commercialization Div. Manaig, L.M.A. Philippines Univ. Los Baños, College Laguna (Philippines). Office of the Vice Chancellor for Research and Extension.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue No. 7 p. 20-32. 2017.*

Biofuel feedstock development is in limelight because of its pronounced capability to reduce greenhouse gas emissions (GHG). The move towards renewable energy intensified research to provide concrete attestations that could be benefited from the effort. This research assessed the GHG reduction potential of biodiesel produced from Jatropha curcas L., relative to that of the conventional petroleum diesel. Computations were based on a standard 30-MLPY biodiesel plant with a co-generation facility, utilizing the byproducts of the process for electricity production. The GHG emissions were standardized and presented as equivalent carbon dioxide emission (CO2e). The boundary set for the analysis was from cradle to grave, considering the life-cycle from the production of the feedstock to the production of biodiesel, and eventually, its end-use. The Life Cycle Assessment (LCA) resulted to a negative net carbon footprint due to the carbon dioxide sequestration capability of the Jatropha plants. The whole system has a net CO2e footprint equivalent to 1,706,365.26 Mg CO2e a-1. Without considering the carbon dioxide absorbed by the plants, LCA of Jatropha biodiesel is still about 25% cleaner than petroleum diesel fuel. With sequestration, the GHG emission reduction can go as high as 548.38%. With the current Philippine biodiesel blending of 2%, if Jatropha methyl ester was used for the blending, this study shows that emission can be cut by 11%. And with increase in the blending, a more positive amount of savings will be achieved, which if at B100, savings could go as high as 581.18%.

JATROPHA CURCAS; DIESEL ENGINES; BIOFUELS; CARBON; GREENHOUSE GASES; RENEWABLE ENERGY

Energetics and water requirement of a commercial-scale sweet sorghum ethanol production. **Demafelis, R.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering. rbdemafelis@up.edu.ph., rbdema@yahoo.com., Alcantara, A.J., Pacardo, E.P., Flavier, M.E. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Matanguihan, A.E.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue No. 7 p.1-11. 2017.*

This study quantifies the energy balance and water requirement for ethanol production from sweet sorghum. The energy balance assessment is important to verify if the system actually achieves a positive net energy balance, while inventory of water requirement provides primary approximation of the water economy of this alternative feedstock. The boundary of the assessment is from the production of the feedstock to the products' end-use (cradle-to-grave). All the balances were based from a 30-M L/yr capacity commercial bioethanol plant that operates for 270 d/yr. The net energy balance of the system was computed by accounting the total energy consumed by the materials and processes in the

boundary equated with the total energy produced through the products – power and biofuel. From the assessment, it was verified that the production gains a net energy equivalent to 475,621,789.51MJ/yr or 15.85 MJ/L of ethanol produced. Since the assessment assumed that a new bioethanol facility will be put up, the analysis included the energy invested during this pre-operational period, termed as 'energy debt'. Construction of the whole facility expended a total of 1,127,076,244.75MJ energy or 37.57 MJ/L ethanol. However, because the system gains a net energy, a payback period for the energy invested was computed by dividing the total energy debt by the net energy gain. It was deduced that energy debt can be offset or paid back within 2.37 years of operation. Meanwhile, the total water economy in the construction of the bioethanol plant amounts to 960,453.44 m3. Likewise, the whole operation consumed a total of 12,368,904,260.86 L for a year's operation, which is equivalent to 412.30 L water/L ethanol produced, or 19.45 L/MJ, or 24,541.48 L/T cane processed.

SORGHUM BICOLOR; ETHANOL; PRODUCTION; WATER REQUIREMENTS; ENERGY BALANCE

Optimization study of biodiesel production from refined palm oil via base-catalyzed transesterification. **Libunao, D.W.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Engineering Science. dblibunao@up.edu.ph., donna.libunao@gmail.com., Alcantara, A.J. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Bambase, M.E. Jr., Dizon, L.S.H. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue No. 7 p. 33-39. 2017.*

With the implementation of the Philippine Biofuels Act of 2006, the country continues to search for new biodiesel feedstock and in improving on existing processes related to biodiesel production. In this study, contributions to these two fields of research were done. Palm oil is currently being considered at by the Philippine government as a potential biodiesel feedstock to augment coconut. This study aimed to optimize parameters for biodiesel production using refined palm oil as feedstock by varying the methanol-to-palm oil molar ratio (MeOH:PO) and the palm oil-to-sodium hydroxide molar ratio (PO:NaOH) with the aid of Response Surface Methodology (RSM) at constant temperature (30°C) and reaction time (60 min). The obtained optimum ranges are: 6.5-6.9:1 for MeOH:PO and 1:0.27-0.32 for PO:NaOH. After the optimum ranges for both ratios were determined, the effect of adding various amounts of FAME to the reaction system at the start of transesterification was studied in an attempt to break the immiscibility of methanol and oil in order to increase FAME yield. The increasing the initial amount of FAME added resulted to an increase in the amount of %FAME yield. In the experimental run where 50% by weight (wt%) of FAME was added, %FAME yield was 64%, which is more than double compared to

that of the control (29%). These proved that biodiesel could be produced at milder reaction conditions and would require less energy input.

PALM OILS; DIESEL ENGINES; BIOFUELS; PRODUCTION

Storage stability test of sweet sorghum SPV 422 (Sorghum bicolor L. Moench) syrup. **Gatdula, K.M., Movillon, J.L. kmgatdula@up.edu.ph., stel.gatdula@gmail.com., Guerrero, G.A.M., Arellano, D.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue No. 7 p. 48-55. 2017.*

A four-month storage stability test on the sweet sorghum (SPV 422) syrup was conducted. The syrup's initial Brix, storage containers' material of construction and incubation temperature were the experimental parameters. A higher degree Brix concentration of around 40-65 degree Brix is preferred due to having least reductions in the reducing sugar content, pH and dissolved solids concentration upon storage. This study also confirmed that high density polyethylene (HDPE) was a more suitable material than carbon steel for storage containers of sweet sorghum syrup. On the other hand, analyses of the dependence of the syrup's stability on storage temperature proved that a higher temperature 40 deg C was more preferred for lesser degree of changes in amount of reducing sugars and Brix. Conversely, a larger drop in pH was observed at 40 deg C incubation temperature.

SORGHUM BICOLOR; KEEPING QUALITY; REDUCING SUGARS; TEMPERATURE

Sweet sorghum juice and syrup production using conventional sugarcane mill and evaporator. **Demafelis, R.B. rbdemafelis@up.edu.ph., rbdema@yahoo.com., Gatdula, K.M., Malabuyoc, J.A.S., Baticados, E.J.N. Philippines Univ. Los Baños, College Laguna (Philippines). Chemical Engineering Dept.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue No. 7 p. 40-47. 2017.*

In light of heightened discussions regarding food vs. fuel issue, different feedstocks have emerged to compromise in meeting the desired volumetric requirement of bioethanol in the country. Sweet sorghum is considered as one of the promising feedstocks taking into account its remarkable characteristics such as shorter crop duration, less water and fertilizer requirement and its compatibility in terms of planting in idle lands. This study focused on the prospect of producing sweet sorghum juice and syrup using conventional sugarcane mills and evaporators. Parameters vital in juice extraction and evaporation sections have been determined to assess its qualities and compared with that of sugarcane. For the milling station, the first expressed juice obtained a Polarity of 6.54 %, apparent purity of 50.97 % and 12.83 deg Brix. For the mixed juice, same parameters were

determined (Polarity of 4.76%, apparent purity of 46.21%, Brix of 10.26 deg). Lastly, the bagasse contained 1.66% Pol, 50.11% moisture and 48.23% fiber. Pol extraction was also calculated as 88.29%. In terms of syrup production, a Brix of 65 deg and Polarity of 50.05% were achieved. To assess the performance of the evaporators, % evaporation was computed and a value of 83.87% was obtained.

SORGHUM BICOLOR; PLANT PRODUCTS; BIOFUELS; EQUIPMENT; EVAPORATION; EXTRACTION

P10 - WATER RESOURCES AND MANAGEMENT

Assessing soil erosion and flood risk areas in Santa Rosa-Silang [Philippines] Watershed using LiDAR [Light Detection and Ranging] data and SWAT [Soil and Water Assessment Tool] modeling. **Gunay, C.J.C. Tokyo Metropolitan Univ. Tokyo, (Japan). zcgunay@up.edu.ph., Magcale-Macandog, D.B. Philippines Univ. Los Baños, College, Laguna(Philippines). Inst. of Biological Sciences. Bragais, M.A. Geographic Innovations for Development Solutions, Inc., Los Baños, Laguna (Philippines).** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 29 (2) p. 23-38. 2019.* https://erdb.denr.gov.ph/2020/05/01/sylvatrop-volume-29-no-2-july-to-december-2019/

The physical impacts of extreme weather disturbances such as storms and typhoons had been increasing in Santa Rosa-Silang Watershed, where rapid land use conversion and high population pressure are major environmental issues. In this study, the Soil and Water Assessment Tool (SWAT) model was used to analyze the hydrology and sediment yield in the 102-km sq watershed. Spatial information such as digital terrain model and land cover map, both processed and validated using remote sensing and Light Detection and Ranging (LiDAR) data, and soil map together with 36-year rainfall and temperature data, were imported in the model's platform to generate surface inflow, outflow, and sediment yield in the 49 hydrologic response units (HRUs) in the watershed. With these, specific HRUs vulnerable to flooding and erosion were identified and most of these areas were reflective of the high risk barangays previously identified by the local government. Flash flood and erosion occurrences in these areas were primarily due to the low permeability and weak stability of their land cover during extreme rainfall. The results of this study can be an initial scientific basis in developing area-specific mitigation and adaptation strategies to climate-related natural disasters.

WATERSHEDS; EROSION; FLOODING; EROSION CONTROL; FLOOD CONTROL; GEOGRAPHICAL INFORMATION SYSTEMS; SIMULATION MODELS; HYDROLOGY; PHILIPPINES

Assessment of aquifer vulnerability in Baghmalek plain in Khuzestan, Iran using GIS [Geographical Information System] DRASTIC model. **Galareh, R., Islamic Azad Univ., Ahvaz (Iran). Dept. of Water Sciences and Engineering. Kashkuli, H., Zohrabi, N. Islamic Azad Univ., Ahvaz (Iran). Dept. of Water Sciences and Engineering. nargeszohrabi@gmail.com.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 26-35. 2018.*

The purpose of this study was to assess the vulnerability of groundwater in Baghmalek aquifer to pollution. The groundwater vulnerability was simulated in Geographical Information System (GIS) using DRASTIC model. Indeed, GIS clarifies the results of a complicated model through visual representation, which provided an applicable tool for decision makers. The vulnerability map of Baghmalek basin shows four classes including no risk to pollution, very low vulnerability, low vulnerability, and low to moderate vulnerability depending on the intrinsic characteristics. The results of the model indicate that the northern parts of the plain are more vulnerable than the southern parts.

GROUNDWATER; GROUNDWATER TABLE; WATER POLLUTION; GEOGRAPHICAL INFORMATION SYSTEMS; MODELS; IRAN ISLAMIC REPUBLIC

Coping with flooding: local response of communities in Brgy. [village] Malinta, Los Baños [Laguna, Philippines] to this climatic hazard. **Malabayabas, F.L. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance. flmalabayabas@up.edu.ph., Baconguis, R.D.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development.** *Ecosystem and Development Journal (Philippines). 2012-3612. v. 7 (1) p. 21-32. 2017.*

This participatory research was conducted in lieu of the Laguna [Philippines] provincial government's hazard map where the community was identified as flood free. However, the recent flooding in the community revealed that this flooding is not a new occurrence. The study sought to determine the history of flooding in the area, extent of its effect on the households and the community as well as the coping strategies employed. Participatory tools and techniques such as village walk, historical timeline, participatory mapping, Venn diagram, livelihood analysis, and SWOT were used to gather data. The participator y mapping revealed that the most recent flooding affected 472 households and reached as high as 5 feet in some areas. The historical analysis showed that typhoons from 2006-2012 resulted in the longest the worst flooding affecting the village. The study documented how the local communities responded to the series of flooding with the hope that it will raise awareness in the provincial government to update its map and correspondingly provide measures to reduce community vulnerability. The recommendations include a preparation

of an IEC for disaster preparedness and disaster response plan to help the community proactively address flooding.

FLOODING; WATER RESOURCES; CLIMATE; RISK; SOCIAL PARTICIPATION; HOUSEHOLDS

GIS [Geographic Information Systems] development of flash flood guidance with selection of reforestation and conservation areas for Bigaan River Basin, Cagayan de Oro City, Philippines. **Vallente, J.R. Jr., jvallente@xu.edu.ph., Abuzo, A.A. Xavier Univ.-Ateneo de Cagayan, Cagayan de Oro, Misamis Oriental (Philippines). Disaster Risk Environment and Management Civil Engineering Dept.** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 29(2) p. 55-73. 2019.*

Flash floods occur due to varying meteorological and hydrological conditions of the river basin, and changes in climate and land use. These variables make forecasting and detecting flash floods challenging, especially since ares with land use and land cover (LULC) characteristics and vulnerable to heavy flash flood. In Cagayan de Oro, recent calamities brought by extreme rain events affected 2 barangays [villages] Cugman and Gusa -within the Bigaan River Basin. This research aimed to investigate the Flash Flood Guidance system as an early flood warning mechanism, and suggested areas for reforestation and conservation through GIS [Geographic Information System] mapping and land use characteristics. Techniques in geospatial technology, such as remote sensing and geographic information system, were widely used. With field validation, these technologies analyzed the LULC characteristics of the area. Satellite imagery from 2015 obtained through the latest Landsat satellite mission were used to classify the different LULC of the basin. Results determined the flash flood guidance system for the river basin and the areas which needed reforestation and conservation.

WATERSHEDS; FLOODING; LAND USE; REFORESTATION; GEOGRAPHICAL INFORMATION SYSTEMS; IMAGERY; REMOTE SENSING; PHILIPPINES

Lead biomagnification in a food web of the open waters along Sta. Rosa Subwatershed, Philippines. **Tingson, K.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Forestry and Natural Resources. kntingson1@up.edu.ph. Zararalla, M.T., Macandog, D.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Arts and Sciences. Rañola, R.F. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Economics and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 110-119. 2018.*

Contamination of lead in fishes from Laguna de Bay [Los Baños, Philippines] was previously recorded to have the highest concentrations that may pose a hazard to human health.

However, no previous study was conducted on its biomagnification. This research is the first exploratory study that examined lead biomagnification in a food web of the lake. Water quality, aquatic communities, trophic levels and lead concentrations were analyzed during the dry and wet seasons. Lead concentrations were analyzed using Atomic Absorption Spectrometry. Levels of lead in the water were 0.05 mg/L and 0.03 mg/L for dry and wet seasons, respectively. Lead concentrations increased in phytoplankton with 3.87 and 9.66 mg/kg lead during wet and dry season, respectively. Furthermore, lead levels increased in zooplankton with 2.92 and 14.31 mg/kg during wet and dry seasons, respectively. In fishes, the highest lead concentration in dry season was detected in Hypophthalmichthys nobilis with 0.38 mg/kg while the highest during wet season was observed in Oreochromis niloticus with 0.67 mg/kg. Lead biomagnification was observed in this study in the following order: water < phytoplankton < zooplankton. However, this increasing trend did not continue up to fishes.

WATERSHEDS; LEAD; BIOACCUMULATION; CONTAMINATION; WATER POLLUTION; WATER QUALITY; PHILIPPINES

Reliability of the Sarno River Visual Assessment Protocol (SRVAP) as a river quality evaluation tool: result from initial assessment in Aborlan River, Philippines. **Macuroy, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Devanadera, Ma. C.F., Roxas, E.D., Salvacion, A.R., Sandalo, R.M. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Community and Environmental Resource Planning.** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 113-127. 2017.*

River water quality monitoring is crucial in the conservation and maintenance of any river system. The extensive requirements, high costs, and complex data makes continuous monitoring difficult. Simpler methods that assess visual characteristics to convey the general quality of the river condition were developed. This study applied the Sarno River Visual Assessment Protocol (SRVAP), a modified version of the Stream Visual Assessment Protocol (SVAP) developed by the United States Department of Agriculture (USDA). The SRVAP, a procedure which utilizes direct observations of the general state of riparian areas, is applied to Aborlan River in the province of Palawan, Philippines. SRVAP reliability as predictors of physicochemical parameters of the river were tested using regression analysis. Results showed that SRVAP is significantly correlated with temperature and total suspended solids (TSS) and can therefore be used as rapid predictors of the physicochemical parameters of Aborlan River. Also, results of the study showed that local knowledge is significant in estimating the values of temperature and TSS.

RIVERS; WATER QUALITY; MONITORING; CHEMICOPHYSICAL PROPERTIES; TEMPERATURE; PHILIPPINES

P33 - SOIL CHEMISTRY AND PHYSICS

Mid-infrared spectroscopy and partial least-square regression for predicting soil properties in Philippine Coffee forms. **Umali, B.P. bpumali@gmail.com., Flores, J.A. fa0022j@gmail.com., Vodoña, B.S. bessvidena@gmail.com., Garcia, K.R.S. krisgarcia70@gmail.com., Rivera, A.F. Cavite State Univ., Indang, Cavite (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 176. 2019.*

The potential of mid-infrared (MIR) spectroscopy coupled with partial least-squares (PLS) was investigated to predict several soil properties in Philippine coffee farms. Key soil properties including soil organic matter (OM), available Phosphorous (P), exchangeable Potassium (K), electrical conductivity (EC), pH, and clay content were measured and predicted. A diffuse reflectance Fourier transform infrared (FTIR) spectrometer was used to acquire spectral data of soils collected from different coffee-producing provinces in the country. The spectral data were explored under different pre-processing techniques, namely - multiplicative scatter correction, standard normal variate, and Savitzky-Golay filter. The resulting spectral data from each pre-processing techniques were then used individually for the PLS model development. Different PLS models for each soil property were compared with the best prediction model selected based on coefficient of determination (R2) and root mean square error (RMSE). With the selected PLS models, several soil properties were predicted with acceptable results (R2 = 0.66 to 0.83) including soil pH, OM content, and clay content. In contrast, the PLS models developed for soil EC, available P and exchangeable K have relatively weaker prediction performances (R2 = 0.06 to 0.56). The result of this study suggests a potential approach that can be used to rapidly assess the soil nutrient in Philippine coffee farms.

COFFEA; FARMS; SOIL CHEMICOPHYSICAL PROPERTIES; SPECTROMETRY; METHODS; PHILIPPINES

Physicochemical characteristics of soils in a salt-affected lowland and rice environment and implication to productivity. **Labios, J.D. jdlabios@up.edu.ph., Rosales, J.E.M., Sanchez, P.B. Philippines Univ. Los Baños, College Laguna (Philippines). Soil Science Div.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 167-178. 2020.*

There is lack of useful information that provides through understanding of the extent and severity of soil problems in salt-affected coastal lowland rice areas and their effect on farmer productivity. Soil physicochemical characterization was conducted in eight coastal rice fields in Balayan, Batangas, Philippines with varying distances from a source of saltwater intrusion. Soil, plant and water samples were collected and analyzed from August 2014 to April 2015. Key farmer interviews were conducted. Soil organic matter was high in the wet season (WS) until the dry season (DS). Levels of soil nitrogen and phosphorus (P) were high at the end of WS and DS, indicating residuals from fertilization, and higher in fields closer to the swamp. The cation exchange capacity and base saturation in all sites were high. Zinc levels were low and maybe due to high soil P. Results showed mildly alkaline soil at pH 7.4-7.7 across season. Soil electrical conductivity was higher in fields closer to the swamp and highest at end of WS. High exchangeable sodium percentage (ESP) indicates the presence of a high proportion of sodium in all fields regardless of distance from the swamp and at mean=17.68% is higher than the limit set for sodic soil (15% ESP). Rice yields were within the range of varietal potential, including salinity tolerant variety Salinas, except in the field closets to the swamp which may be related to high ESP and soil sodium levels. This coastal lowland rice agroecosystem is classified as productive and the soil relatively fertile but prone to salinity and sodicity through saltwater intrusion from nearby swamps. Continued monitoring must be done so that farmers may be advised on soil fertility status and appropriate management options to sustain productivity.

RICE; LOWLAND; SOIL SALINITY; SOIL SALINIZATION; SOIL ANALYSIS; SALINE WATER; SALINITY; RICE FIELDS; FIELD EXPERIMENTATION

Soil phosphate sorption characteristics of selected calcareous soil series of Southern Punjab, Pakistan. **Khan, S. khandsadia347@gmail.com., Khan, Q.U., Muhammad Jamil Khan. Gomal Univ., Dera Ismail Khan (Pakistan). Inst. of Soil and Environmental Science. Khattak, S.G., Khan, A.A. Agriculture Research Station Kohat (Pakistan). Khan, A.A. Gomal Univ., Dera Ismael Khan (Pakistan). Dept. of Agronomy.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 1-7. 2018.*

To estimate the sorption and desorption capacity of some selected calcareous soils Jhatpat, Miani Pacca and Hadhwar from Southern Punjab in Pakistan were analyzed. The sorption was recorded in the Miani pacca soil series with value sorption 201. 23 mg/kg which was followed by the Hadwar series with peak sorption value of 190.04 mg/kg. The lowest value of sorption was determined in the Jhatpat soil series. Comparing the different models (Langmuir, Freundlich and Temkin) Freundlich model showed good fit to the sorption isotherms with regression coefficient (R2) having value of 0.99, 0.99 and 0.98 for Jhatpat, Miani pacca and Hadhwar soil series respectively, which was higher than the other two

models used. The study on the effect of equilibration time (1, 10, 30 and 60 days) of applied inorganic Phosphatic fertilizers, i.e. Single super phosphate (SSP) and diammonium phosphate (DAP) at 60 and 120 kg/ha on two soil series with highest P sorption. The P sorption increased with increase in the time of equilibrium, with higher value of extractable P was found 22.246 mg P/kg after 1 day of incubation and it gradually decreased with the lowest value of 8.271 mg/kg after 60 days of incubation.

CALCAREOUS SOILS; PHOSPHATES; SOIL CHEMICOPHYSICAL PROPERTIES; SORPTION; DESORPTION; PAKISTAN

P34 - SOIL BIOLOGY

Biomass and carbon accumulation potentials of mycorrhizal inoculated Acacia mangium and Eucalyptus urophylla seedlings in mined-out areas. **Aggangan, N.S. Philippines Univ. Los Baños College, Laguna (Philippines). National Inst. of Molecular Biology and Biotechnology. nellysaggangan@gmail.com., Racelis, E.L. Philippines Univ. Los Baños, College, Laguna (Philippines). Training for Center for Tropical Resources and Ecosystem Sustainability. Algrabre, I.A.C. Philippines Univ. Los Baños College, Laguna (Philippines). National Inst. of Molecular Biology and Biotechnology.** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 30 (1) p. 67-93. 2020.*

Bioremediation has a great potential in reducing environmental degradation. This is also a strategy used in mitigating climate change through carbon sequestration. This study assessed the biomass and carbon accumulation of Acacia mangium and Eucalyptus urophylla as influenced by commercial mycorrhizal inoculants. Seedlings were inoculated with mycorrhizal inoculants produced locally or obtained abroad, grown in a screen house for 6 months and planted in a mined-out area in Mogpog, Marinduque. The total plant biomass after 27 months in the field was computed using the allometric equation by Martinez-Yrizar et al. (1992). Results showed that A. mangium inoculated with Mycogroe (local inoculant) has the highest total biomass of 33.65 t ha-1 and CO2, of 55.52 t/ha. This is 121.46% increase relative to its control counterpart with biomass content of 15.19t/ha, C of 6.84 t/ha and CO2 of 25.07 t/ha. On the other hand, Mykos30 (abroad) inoculated E.urophylla has a biomass build-up of 11.05 t/ha, C and CO2 density of 4.97 t ha-1 and 18.23 t/ha, respectively. The uninoculated E. urophylla counterpart had a biomass density of 5.30 t/ha with 2.38 t/ha of C and 8.74 t/ha of CO2 stored. The value showed 108% increase in total biomass and stored carbon, relative to the uninoculated ones. These findings suggests that accumulation of biomass and the ability of trees to sequester atmospheric carbon in degraded areas are enhanced by mycorrhizal inoculation.

ACACIA MANGIUM; EUCALYPTUS UROPHYLLA; BIOFERTILIZERS; BIOMASS; CLIMATIC CHANGE; BIOREMEDIATION; SEED; INOCULATION

Seasonal variability in the prokaryotic community structure of the Sabang mangrove soil in Puerto Princesa, Palawan, Philippines assessed by next-generation sequencing of the 16S rRNA gene. **Creencia, A.R. Philippines Univ. Los Baños, College, Laguna (Philippines). National Inst. of Molecular Biology and Biotechnology. arcreencia@up.edu.ph., Opulencia, R.B., Diaz, M.G.Q. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Alcantara, E.P., Monsalud, R.G. Philippines Univ. Los Baños, College, Laguna (Philippines). National Inst. of Molecular Biology and Biotechnology.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (2) p. 154-161. 2020.*

The influence of seasonal variation on the bacterial and archaeal diversity of the mangrove soil in Sitio Sabang. Barangay [village] Cabayugan, Puerto Princesa, Palawan, Philippines was investigated. Sample collections were done in three selected sampling sites along the Sabang River during the dry and wet seasons of 2017. The prokaryotic community structures were determined by Next-Generation Sequencing (NGS) targeting the V3-V4 regions of the 16S rRNA gene, using Illumina Hiseq 2500. Results showed that the soil microbial community in the Sabang mangroves was predominantly inhabited by members of the Phyla Proteobacteria, followed by those of Phyla Cgloroflex and Bactoroidetes. Members of Phyla Firmicutes, Bathyrachaeota, Actinobacteria, Acidobacteria, Euryarchaeota, Cyanobacteria and the DHVEG-6 cluster were also present in varying relative abundance. There was no significant difference in the prokaryotic community structures between the dry and wet season, which implies that mangrove health and its microbial resources have been conserved. Significant differences were observed only for the relative abundance of Proteobacteria and Firmicutes (more abundant in wet season), and Acidobacteria, Chloroflexi and DHVEG-6 cluster (more abundant in dry season). The steep species diversity curves indicate that several other microbial species are yet to be discovered. Additional sampling and further molecular surveys of the Sabang mangrove prokaryotic community structure for at least 2 yr are thus recommended.

MANGROVES; SEASONAL VARIATION; SOIL ANALYSIS; RNA; NUCLEOTIDE SEQUENCE; BACTERIA; CELL COUNTING; SAMPLING; SOIL; SOIL FUNGI; BIODIVERSITY; PHILIPPINES

Soil compaction enhanced the expression of root plasticity, water and nitrogen uptake of rice under mild drought with high N fertilization. **Tran, T.T. ayama@agr.nagoya-u.ac.jp., Suralta, R.R., Takeda, M., Mitsuya, S. Nagoya Univ., Chikusa, Nagoya 464-8601 (Japan). Graduate School of Biological Sciences. Kano-Nakata, M. Nagoya Univ., Chikusa, Nagoya 464-8601 (Japan). International Cooperative Center for Agriculture. rrsmfs@yahoo.com.,**

Yamauchi, A. Nagoya Univ., Chikusa, Nagoya 464-8601 (Japan). Graduate School of Biological Sciences. *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 199-210. 2019.*

The functional roles of root plasticity in rice for adaptation to drought may be affected by the rates of nitrogen (N) application and soil compactions (SC). This study examined the expression of root plasticity and its function for water and N uptake and the maintenance in shoot dry matter production triggered by mild drought with variable rates of N and SC. A chromosome segment substitution line (CSSL50) and its recurrent parent, Nipponbare, were grown under continuously waterlogged (CWL, control) and water deficit (WD; 20% soil moisture content, SMC) conditions. Nitrogen treatments at the rate of 30, 60, 120, 240 and 360 mg N per box were used in Experiment 1 and at 30, 60, and 120 mg N per box in Experiment 2. The fertilizers were mixed well with air-dried sandy loam soil set either at bulk density of 1.25 (light soil compaction) or 1.50 g cm-3 (heavy soil compaction) prior to sowing. under CWL, shoot dry weight (SDW) and total root length (TRL) were not significantly different between CSSL50 and NIpponbare regardless of the rates of N and SC. The genotypic differences in SDW between CSSL50 and Nipponbare were greater at high than at low N regardless of SC treatments. This result was partially attributed to the longer TRL of CSSL50 than that of Nipponbare at high N regardless of SC treatments. This result was partially attributed to the longer TRL of CSSL50 than in Nipponbare was more pronounced at heavy than At light SC at 30, 60, and 120 mg N rates, due to the maintained TRL in the former but reduced TRL in the latter genotype under heavy SC. These results imply that the developmental plasticity of root system triggered by WD can be also expressed with greater magnitude under a more compacted soil with high N rate and contributed to the maintenance in dry matter production.

ORYZA SATIVA; ROOTS; ROOT SYSTEMS; SOIL COMPACTION; RHEOLOGICAL PROPERTIES; DROUGHT; STRESS; NITROGEN; DRY MATTER CONTENT

P36 - SOIL EROSION, CONSERVATION AND RECLAMATION

Assessing soil erosion and flood risk areas in Santa Rosa-Silang [Philippines] Watershed using LiDAR [Light Detection and Ranging] data and SWAT [Soil and Water Assessment Tool] modeling. **Gunay, C.J.C. Tokyo Metropolitan Univ. Tokyo, (Japan). zcgunay@up.edu.ph., Magcale-Macandog, D.B. Philippines Univ. Los Baños, College, Laguna(Philippines). Inst. of Biological Sciences. Bragais, M.A. Geographic Innovations for Development Solutions, Inc., Los Baños, Laguna (Philippines).** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 29 (2) p. 23-38. 2019.*

The physical impacts of extreme weather disturbances such as storms and typhoons had been increasing in Santa Rosa-Silang Watershed, where rapid land use conversion and high population pressure are major environmental issues. In this study, the Soil and Water Assessment Tool (SWAT) model was used to analyze the hydrology and sediment yield in the 102-km sq watershed. Spatial information such as digital terrain model and land cover map, both processed and validated using remote sensing and Light Detection and Ranging (LiDAR) data, and soil map together with 36-year rainfall and temperature data, were imported in the model's platform to generate surface inflow, outflow, and sediment yield in the 49 hydrologic response units (HRUs) in the watershed. With these, specific HRUs vulnerable to flooding and erosion were identified and most of these areas were reflective of the high risk barangays previously identified by the local government. Flash flood and erosion occurrences in these areas were primarily due to the low permeability and weak stability of their land cover during extreme rainfall. The results of this study can be an initial scientific basis in developing area-specific mitigation and adaptation strategies to climate-related natural disasters.

WATERSHEDS; EROSION; FLOODING; EROSION CONTROL; FLOOD CONTROL; GEOGRAPHICAL INFORMATION SYSTEMS; SIMULATION MODELS; HYDROLOGY; PHILIPPINES

Potential of using unmanned aircraft systems for landslide monitoring: the case of Janowiec landslide in Poland. **Cmielewski, B. Wroclaw Univ. of Technology, LabScan3D, ul. Boleslawa Prusa 55/55, 50-317 Wroclaw (Poland). bartolomiej.cmielewski@pwr.edu.pl., Dabek, P.B. Wroclaw Univ. of Envoronmental and Life Science, LabScan3D, ul. Boleslawa Prusa 55/55, 50-317 Wroclaw (Poland). Inst. of Environmental Development and Protection. Patrzalek, C. Wroclaw Univ. of Envoronmental and Life Science, LabScan3D, ul. Boleslawa Prusa 55/55, 50-317 Wroclaw (Poland). Dept. of Spatial Economy. Wilczynska, I. Wroclaw Univ. of Envoronmental and Life Science, LabScan3D, ul. Boleslawa Prusa 55/55, 50-317 Wroclaw (Poland). Inst. of Geodesy and Geo.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 8-25. 2018.*

One of the first visible signs of landslide occurrence is changes in microrelief of the slope. In the classical landslide monitoring procedure to determine the land deformation, direct surveys are used. To get accurate and actual information about the object, the ultrahigh resolution unmanned aerial systems imagery can be applied. A digital surface model can be developed and utilized to create a high-resolution orthophotograph as well as a point cloud, which can be used to develop a digital terrain model. Pictures taken by unmanned aerial vehicles have a ground resolution of a pixel on the level of single centimetres. This type of cartometric material is developed in short time and allows to specify the landslides range and features, and in evaluating the mass movement. Cyclical measurements also allow to determine the resulting deformation although it should be noted that the accuracy of

survey depends on the vegetation process. In this study, the methodology of landslide monitoring using unmanned aerial systems as well as comparative analyses to the other techniques such as terrestrial laser scanning or airborne laser scanning, were presented.

EQUIPMENT; LANDSLIDES; AERIAL APPLICATION; AERIAL SURVEYING; LASERS; MONITORING; POLAND; PHOTOGRAPHY

P40 - METEOROLOGY AND CLIMATOLOGY

Assessing the performance of climate smart rice production systems in the upper part of the Vietnamese Mekong River Delta. Khoi, D.K. Vietnamn National Agricultural Univ., Ha Noi (Vietnam). **Agricultural Market and Institution Research Inst. khoidk@gmail.com., Thu, D.M. Institute of Policy and Strategy for Agricultural and Rural Development, Ha Noi (Vietnam). Lien, L.T.H., Ninh, N.T.T. University of New England, Armidale (Australia). Thinh, P.D., Thiep, D.H., Dat, N.S. Vietnamn National Agricultural Univ., Ha Noi (Vietnam). Agricultural Market and Institution Research Inst. Ngoc, V.T.B., Anh, N.P. Institute of Policy and Strategy for Agricultural and Rural Development, Ha Noi (Vietnam).** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 18 (1) p. 15-29. 2021.*
https://ajad.searca.org/article?p=1454

Climate smart agriculture (CSA) has gained considerable attention in Vietnam due to its potential to increase food security and farming system resilience while decreasing greenhouse gas emissions. In recent years, several CSA practices have been introduced in rice production, the most important sub-sector of Vietnam's agriculture. However, few studies have been done in Vietnam to produce comprehensive assessments of CSA performance in the rice sector. This research proposes a comprehensive approach to assess CSA practices through a new set of evaluation indicators. A case study in An Giang province of the Vietnamese Mekong River Delta was implemented to evaluate the performance of five CSA models versus that of the triple rice crop system (i.e., benchmarking model). Results show that rice-shrimp and rice-lotus rotations are most profitable, low-risk, and applicable at a larger scale. Given that the current study analyzed and calculated only a small number of indicators and types of CSA practices, further research is necessary to test all indicators and diversified types of CSA models.

ORYZA SATIVA; FARMING SYSTEMS; CROP PERFORMANCE; PRODUCTION; CLIMATIC CHANGE; ADAPTATION; MEKONG RIVER; VIET NAM

Assessment of farmer's climate change resiliency in selected Community-Based Forest Management areas in Laguna, Philippines. **Lalican, E.R. Philippine Council for Agriculture,**

Aquatic and Natural Resources Research and Development, Paseo de Valmayor, Economic Garden, Los Baños (Philippines). erlalican@gmail.com. *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 30(1) p.23-45. 2020.*
https://erdb.denr.gov.ph/2020/09/08/sylvatrop-volume-30-no-1-january-to-june-2020/

The study assessed the farmer's resiliency to climate change in selected Community-Based Forest Management (CBFM) sites in Laguna [Philippines]. The analysis was limited only to socio-economic characteristics, agroforestry system's supporting services and regulating services as these have an immediate effect on farmer's resiliency and socio-economic productivity. Stratified random sampling was used for household sampling in CBFM sites. Furthermore, direct on-site measurement for ecosystems services and interview schedule were used in evaluating the factors used for the analysis. Farmer's resiliency was determined through 'resiliency scoring'. Result of analysis revealed that PO members in Liliw, Laguna have moderate to high degree of resiliency to climate change while all non-PO members have moderate resiliency to climate change. All farmer respondents would adapt with the effect of climate change by looking for other sources of income, government support, and adopting other farming techniques. There is a strong association between the membership status (member or non-member) and the intensity of resiliency (highly or moderate) of the respondents.

FOREST MANAGEMENT; COMMUNITY FORESTRY; CLIMATIC CHANGE; FARMERS; PHILIPPINES

Comparative assessment of different methods in generating design storm hyetographs for the Philippines. **Duka, M.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Land and Water Resources Div. mauriceduka@gmail.com. Lasco, J.D.D. University of Texas at Austin, TX (USA). Dept. of Civil, Architectural And Environmental Engineering. Veyra, C.D. Jr., Aralar, A.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Land and Water Resources Div.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 82-89. 2018.*

Design storm hyetographs are synthetic temporal rainfall patterns used as input for flood modeling studies, drainage design and hydrodynamic modeling. In practice, the Philippines adopts the alternating block (AB) method to derive hyetographs using PAGASA [Philippine Atmospheric, Geophysical and Astronomical Services Administration]-synthesized rainfall intensity-duration-frequency (RIDF) curves. In this study, six other methods-AB from actual RIDF curve, actual normalized 24-hour storms and four different patterns derived by Huff (1967)- were tested using the tipping-bucket rain gauge records of a local weather station. Nonparametric statistical tests were employed to determine the significant difference

between and among distributions. Moreover, Chi-squared goodness-of-fit test was used to compare the hyetographs with data from actual storms. The PAGASA AB hyetographs, while accurate in some instances, do not always represent actual storms well. Furthermore, other methods may have better fits for other storms. This study recommends further research in establishing design hyetographs in the Philippines.

STORMS; ALTERNATIVE METHODS; RAIN; FLOOD CONTROL; FLOOD IRRIGATION; METEOROLOGICAL STATIONS

Defining optimal geographic insurance units for weather index-based insurance in the Philippines. **Alcaide, K.D.R., Lansigan, F.P. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 8. 2019.*

The study focused on establishing the most efficient geographic insurance units (GIUS), as basis in the design of weather index-based crop insurance (WIBI) for rainfed rice in selected provinces in the Philippines, namely: Isabela, Iloilo and Bukidnon. The study aimed to characterize the said locations based on weather patterns, and crop risk profiles in terms of probability of crop failure in order to determine which areas will be subjected to similar index insurance designs, and which farms will be considered with a different one. Initial GIU designs were established based on political boundaries (municipal, district, or provincial boundaries) for operational considerations. Optimal GIU designs for each province considered were then identified using the two criteria: (1)area-specific weather distribution through mean monthly rainfall patterns; and (2)crop risk profiles based on the probability of crop failure due to rainfall deficit. Analyses were based on forty-one years of synthetically generated, and validated rainfall data from 2010 to 2050. In order to define the optimal GIUs for each province, comparison of the two sets of results were done based on their data requirements and practical efficiency of implementation in the field. For Isabela province, a total of twelve GIUs were defined. In the case of Iloilo, seven GIUs were defined. While for Bukidnon, five GIUs were developed. Results of the study are intended to be used to minimize risk, and thus, reduce the premium for the insurance product. By defining GIUs for WIBI, the insurance products will have high potential in effectively helping farmers cope with and eventually manage climate risks.

ORYZA SATIVA; RAINFED FARMING; RISK; RAIN; CROP INSURANCE

Factors associated with farmers' adaptation practices to weather variability in rice-based farming system in Myinmu Township, Sagaing Region, Myanmar. **Khaing, K.T. Yezin**

Agriculrtural Univ. Yezin (Myanmar). dept. of Agricultural Extension. kaythinkaing2004agro@gmail.com., Boconguis, R.D.T., Serrano, E.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Sta. Cruz, P.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Agriculture and Food Science. Cambel, R.G. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Arts and Sciences. *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 4 p. 169-199. 2017.*

Due to its dependence on agro-climate condition, the rice-based farming system in Myinmu Township in Central Dry Zone (CDZ), Myanmar is one of the sectors that is vulnerable to weather variability. This study aimed to analyze the association of adaptation practices on production and income of rice farmers in Myinmu Township. One hundred fifty farmers were surveyed and key informant interviews were conducted to gather primary data. Results revealed that most farmers received agricultural and weather information from fellow farmers, extension agents from the Department of Agriculture, attendance to group meetings, and mass media channels such as radio and television. Adaptation practices were categorized into changing cultivated varieties and crops, changing farming systems, conserving rain water, improving irrigation systems, and engaging in non-farm activities. Factors associated with adaptation practices were type of agriculture (ecosystem), total cultivated area, total rice cultivated area, credit accessibility, attendance to training programs and access to inputs. Overall, results revealed an observable pattern of increased weather variability and minimal adaptation practices, which calls for a more vigorous extension intervention to promote practices that can minimize the impact of weather variability on farmers' production and income.

ORYZA SATIVA; FARMING SYSTEMS; TECHNOLOGY; ADAPTATION; TECHNOLOGY TRANSFER; FARMERS; WEATHER; MYANMAR

Factors influencing farmers' climate change adaptation in Northern Ghana: evidence from subsistence farmers in Sissala West, Ghana. **Fagariba, C.J. Wuhan Univ. of Technology, Wuhan-Hubei Province (China). School of Environment and Natural Resource Engineering. Shaoxian Song. Wuhan Univ. of Technology, Luoshi Road 122, Wuhan, Hubei, 4300700 (China). Hebei Key Lab. of Mineral Resources and Processing Environment. Soule, S.K.G. Wuhan Univ. of Technology, Wuhan-Hubei Province (China). School of Environment and Natural Resource Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 31-73. 2018.*

Most African countries are vulnerable to climate change as a result of poverty, weather extremes, and insufficient governmental agricultural support. Using the area of Sissala West District, factors influencing farmers' adaptation to climate change and strategies used to

avert climate change impact were determined. A total of 330 small-scale farmers were sampled and their views were determined Using logits regression model, weighted average index, and frequency table. Weighted average index was used to rank opinions of 150 key informants in focus group discussions. Using logits regression model, the study indicated irregular rainfall, high temperature, weather information, and high evaporation as the factors compelling farmers to adapt to climate change. Weighted Average Index used to measure weather extremes revealed that drought and temperature had the highest level of occurrence. Furthermore, climate change adaptation strategies assessed in the study showed that agroforestry practices, drought-resistant crops, and mulching were the most preferred methods. The study concluded that farmers' ability to adapt to climate change can be improved if Environmental Protection Agency and Ministry of Food and Agriculture intensify climate adaptation campaigns, increase access to weather information, and training farmers on adaptable strategies including, but not limited to, alternative sources of livelihood.

FARMERS; ADAPTATION; CLIMATIC CHANGE; AGROFORESTRY; GHANA

Farmers' perception on the sustainability of a Rubber- Based Agroforestry System as a climate change adaptation strategy in Agusan Del Sur and North Cotabato, Philippines. **Furoc-Paelmo, R. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Cosico, R.S.A., Cabahug, R.E.D., Castillo, A.K.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Agroforestry. Castillo, A.S.A., Visco, R.G. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 45-60. 2018.*

This documentation research sought to evaluate the effectiveness of rubber-based agroforestry typologies as a climate change adaptation strategy in the major rubber producing regions in the Philippines, particularly in Agusan del Sur and North Cotabato [Philippines]. It focused on the understanding/perception of the RBAS farmer respondents on climate change and their account of its influence on the production system and their coping mechanisms. Among the farmer respondents, drought (El Niño), typhoon, strong winds, heavy rains/excessive rainfall, flash floods and landslides are among the common evidences of climate change. Generally, most of the adaptation strategies employed is through cultural management practices like minimized usage of inorganic fertilizer and chemical pesticides from Agusan del Sur farmer respondents while some of the farmer respondents in North Cotabato employed organic farming practices to adapt to climate change. For both provinces, farmer respondents particularly identified agroforestry and diversified farming system as an effective adaptation strategy. Results proved the potential of the rubber-based agroforestry system to evolve as a resilient farming practice to adapt to

climate change vis-a-vis stable biological and economic productivity, controlled occurrence of pest and diseases and minimized detrimental effects of climate change on the agroforestry farm component as a whole.

RUBBER; AGROFORESTRY; FARMERS; PARTICIPATION; CLIMATIC CHANGE; CLASSIFICATION; PHILIPPINES; ADAPTATION; CULTURAL METHODS

Heterogeneous climatic impacts on agricultural production: evidence from rice yield in Assam, India. **Nath, H.K. Sam Houston State Univ., 1905 University Ave, Huntsville, TX 77340, (USA). eco_hkn@shsu.edu., Mandal, R. Assam Univ,, Silchar (India). rajum06@gmail.com.** Asian Journal of Agriculture and Development (Philippines. 1656-4383; 2599-3879 v. 15 (1) p. 22-41. 2018.
https://ajad.searca.org/article?p=654

Understanding the nature and extent of climatic impacts on agricultural productivity under a variety of scenarios is extremely important for developing countries, where a sizable portion of the population relies on agriculture for life and livelihood. Thus, this paper presents evidence of heterogeneity in climatic impacts on crop yield in Assam, India. In particular, applying the non-parametric quantile regression technique to district-level data from 1978 to 2005, this study examined heterogeneity in the impacts of temperature and rainfall across seasonal rice varieties (autumn, winter, and summer), agroclimatic (AC) zones, and the distribution of rice yield. The results suggested that, in general, the effects of temperature on yield were not statistically significant for any of the three seasonal rice varieties. However, these effects were not uniform in their magnitudes, signs, and statistical significance across AC zones and yield distribution for each variety of rice. Similarly, there were wide variations in the effects of total precipitation across seasonal varieties, AC zones, and yield distribution. The results also suggested that an increase in temperature variability is beneficial and that rainfall variability is harmful to autumn and winter rice yield. For summer rice, the effects of these two climate variables were positive but statistically insignificant. Given the importance of rice yield for food security and poverty alleviation in Assam, these results could inform the design of appropriate adaptation strategies and public policies to counter the adverse impacts of climate change on agriculture in Assam. Furthermore, since most people in rural areas are engaged in agriculture, these results are important for the sustainability of rural economies.

ORYZA SATIVA; PLANT PRODUCTION; CROP YIELD; CLIMATIC CHANGE; RAIN; TEMPERATURE; INDIA

In the era of climate change: moving beyond conventional agriculture in Thailand. **Lee, S. Seoul National Univ. (South Korea). Asia Development Inst. lee.suyeon@snu.ac.kr.** *Asian*

Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 18 (1) p. 1-14. 2021.
https://ajad.searca.org/article?p=1502

Thailand is ranked among the top 10 countries most vulnerable to climate change, and its farmers have faced the risk of natural disasters almost every year for nearly 30 years. However, those affected by climate change have also been the largest contributors to climate change, increasing the risks they will face in the near future. The intensive use of chemical pesticides in conventional agriculture has harmed not only the environment and biodiversity but the health of both users and consumers. Responding to these problems, several policies have been put in place over the past decades to reduce pesticide usage as well as to encourage farmers to switch to low-carbon and low-pesticide agriculture, namely, organic agriculture. This study reviews policies related to the development of organic agriculture in Thailand and examines whether organic agriculture is an effective adaptation and mitigation strategy to climate change that can also generate enough food. This study finds that the organic sector has been largely driven by the private sector, particularly the agricultural cooperatives and non-governmental organizations (NGOs), which have provided various support ranging from technology transfer, production, financing, distribution, to marketing of organic products. Their role is vital in encouraging farmers to switch to organic farming and growing market opportunities for organic goods. Nevertheless, constraints including inconsistent policies and limited support from the government remain, which, to some extent, weakens the efforts to build sustainable agriculture and climate resilience. To improve organic farming, there is a need for the government agencies to work together with all relevant stakeholders in the organic sector, namely agricultural cooperatives, NGOs, and consumers.

ORGANIC AGRICULTURE; CLIMATIC CHANGE; ADAPTATION; SUSTAINABILITY; COOPERATIVES; THAILAND

Policy and institutional challenges in climate information services provisioning in Philippine agriculture. **Elazegui, D.D., Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. acrola@up.edu.ph., Luyun, R.A. Jr. Philippines Univ. Los Baños, College Laguna (Philippines). Coll. of Engineering and Agro-Industrial Technology. Anastacio, N.J.C., Faderagao. F.J.F., Alvarez, M.C.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 4 p. 51-79. 2017.*
https://jpad.cpaf.uplb.edu.ph/articles/policy-and-institutional-challenges-in-climate-information-services-provisioning-in-philippine-agriculture/

Current and immediate information about the increasingly unpredictable weather conditions are needed to augment conventional knowledge in local communities. Policy analysis on climate information services (CIS) provisioning in the agriculture sector is vital and warranted. This paper describes the global and national CIS policies as well as the institutions involved in provisioning through the characterization of pathways from data generation to dissemination. Further, it identifies the various intermediary users of the CIS and how CIS are ultimately disseminated to the municipal agricultural offices and the farmers. Secondary data sources were searched. Primary data were gathered through key informant interviews. Qualitative methods were used in the analysis. This paper concludes that the Philippines needs a better system to provide climate information through more modern technologies, improved capacities, and more stable institutional partnerships, among others. To sustain or bolster the provisioning of CIS, there must be compliance to standards in the establishment, use, and maintenance of the CIS equipment; improved capacities in the dissemination; and commitment of partners to institutionalize collaboration among the providers and the users of CIS.

CLIMATE; INFORMATION SERVICES; POLICIES; FARMERS; RURAL COMMUNITIES; DIFFUSION OF INFORMATION; AGRICULTURE; PHILIPPINES

Predictive modeling for chickpea blight (Ascochyta rabiei) occurrence in the semi-arid zone using meteorological data from Faisalabad, Pakistan. **Ahmad, S. University of Sargodha, Sargodha 40100 (Pakistan). Coll. of Agriculture. salman.ahmad@uos.edu.pk., Muhammad Aslam Khan. University of Agriculture, Faisalabad 38000 (Pakistan). Dept. of Plant Pathology. Ahmad, I. University of Agriculture, Faisalabad 38000 (Pakistan). Dept. of Forestry and Range Management. Ashraf, E. University of Sargodha, Sargodha 40100 (Pakistan). Coll. of Agriculture. Aatif, H.M. Bahauddin Zakariya Univ., Multan 60000 (Pakistan). Layyah Campus. Ali, A., Safdar, M.E., Anjum, M.Z., Raza, W. University of Sargodha, Sargodha 40100 (Pakistan). Coll. of Agriculture.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 330-339. 2019.*

Chickpea blight is the most destructive disease in the semi-arid zone of Punjab and is mainly controlled through fungicides. However, in this area, the use of fungicides is excessive and non-judicious which could be rationalized through the use of a predictive model based on meteorological variables. The aim of the current research was to develop a disease predictive model of chickpea blight based on temperatures (maximum and minimum), rainfall, relative humidity (RH), and wind speed. Relationship of meteorological variables with disease severity was determined through correlation analysis, and stepwise regression was used to develop the model. For this purpose, 2 yr (2011-12) data of meteorological variables and chickpea blight severity was used. A significant correlation was found between all environmental variables and blight severity. A model based on weekly

meteorological variables fit the data well (R2 = 0.82). Predictions of the model were evaluated on two statistical indices, root mean square error (RMSE) and error (%), which were less than or equal ± 20, indicating that the model was good. The model was validated with 5 yr (2006-10) independent data set. Homogeneity of the regression equations of the two models, 2 yr (2011-12) and 5 yr (2006-10), showed that they validated each other. Scatter plots showed that blight severity was high at maximum (20-24 deg C) and minimum (12-14 deg C) temperatures, 65-70% RH, 5-6 mm rainfall and 5-6.5 km/h wind speed). The chickpea blight model developed during this study is the first meteorological variable model in the semi-arid zone of Punjab and will help to make the predictions of chickpea blight well before the occurrence of the disease; thus, the model can make early an prediction of the time of fungicide application, lessen the use of fungicides, curtail input cost of farmers, and help to mitigate environmental pollution.

ASCOCHYTA RABIEI; CHICKPEAS; BLIGHT; WEATHER DATA; WEATHER FORECASTING; EPIDEMIOLOGY; FUNGICIDES; CROP MODELLING; PAKISTAN

Statistical modeling of crop-weather relationship in India: a survey on evolutionary trend of methodologies. **Paltasingh, K.R. NALSAR Univ., of Law, Hyderabad (India). kirtti@nalsar.ac.in., Goyari, P. Texas Christian Univ., Fort Worth, Texas (USA). phanin12@gmail.com.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 15 (1) p. 43-60. 2018.*
https://ajad.searca.org/article?p=683

Weather factors, like other inputs such as land, labor, seeds, irrigation, fertilizer, and pesticides are also direct inputs in crop production. In a state of agriculture where the adoption and diffusion of modern technologies is very low or almost nil, weather factors count more than other inputs because of their direct and indirect effects. Thus, the link between weather and crop yield will have implications on food supply and crop forecasting and management policies. It is of immense importance to the policymakers, agricultural scientists, agricultural economists, and meteorologists to understand this relationship. The methodology for studying this relationship has undergone many improvements over time. This paper attempts to review the studies in this area done in India and a few from abroad that brought an evolution in the methodology of crop-weather modeling.

CROPS; WEATHER; MODELS; PLANT PRODUCTION; FOOD SUPPLY; FORECASTING; INDIA

Storytelling: a disaster awareness tool among kindergarten pupils. **Tolentino, M.A., Vergara, H., Albor, R.G.S., Dy, M.F.R., Sanchez, R.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Human and Family Development Studies. Bulasag, A. Philippines Univ. Los Baños, College, Laguna (Philippines). Rural High School. Pelegrina,**

D.Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Human and Family Development Studies. *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 73-92. 2017.*
https://jhes.uplb.edu.ph/articles/storytelling-a-disaster-awareness-tool-among-kindergarten-pupils/

This study aimed to explore the effectiveness of storytelling as a disaster awareness tool in improving children's understanding of typhoons. The study probed into children's understanding of a typhoon in terms of knowledge of typhoon definition and effects; recognition of activities before, during and after a typhoon; definition of typhoon occurrence; and identification of ways to give aid to typhoon victims. The Narrative Story Stem Technique was used to elicit responses to a sample of 37 kindergarten respondents from a private school in Laguna [Philippines]. A pre-test and post-test approach was administered to look into changes with children's knowledge on typhoons after the storytelling activity. Results of the comparison between the pre-test and post-test responses showed that children have little to no knowledge of typhoons before the storytelling activity. Likewise, results from the paired t-test revealed that the children's scores significantly increased after the storytelling activity. These findings provide preliminary evidence that storytelling can be an effective tool in teaching children about disaster awareness, particularly on typhoons.

STUDENTS; TEACHING METHODS; DIFFUSION OF INFORMATION; CYCLONES; DISASTERS

Sustainable planting calendar to address climate change. **Seville, C.U. cu.seville@philrice.gov.ph., Parina, C.J.E. Philippine Rice Research Inst., Cansilayan, Murcia, Negros Occidental (Philippines). cj.parina@philrice.gov.ph.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44(Supplement no. 1) p. 178. 2020.*

Climate change is one of the challenges that can affect all aspects of food security including access, utilization and price stability. It also affects the incidence and emergence of pests and disease, thereby affecting food production. Researchers made an effort toward the development of mitigation and adaption technologies for rice in order to cope with the changing climate. It includes the development of planting material, establishment methods and production technologies that are suitable to the existing environments. One of the PhilRice Negros' efforts on addressing the issue is to identify the suitable planting dates for rice establishment. Six rice varieties that include NSIC 302, 354, 360, 398, 400 and 440 were established in a randomized complete block design with 9m2 plot size. A 1-week sowing

interval was done during the dry season of 2019 from first week of November 2018 to midweek of January 2019. Results showed that, sowing of these entries on the last week of November yielded high among other schedules while the lowest was during the mid of December. NSIC Rc354 and NSIC Rc360 were the highest and lowest yielder during the last week November with 6.4t/ha and 3.4t/ha, respectively. The yield pattern was becoming lower as the schedules became late as affected by the availability of water.

ORYZA SATIVA; VARIETIES; PLANTING DATE; CROP MANAGEMENT; CLIMATIC CHANGE; TECHNOLOGY; TECHNOLOGY TRANSFER; ADAPTATION

Vermicompost technology as a potential climate-smart alternative for rice straw management. **Romasanta, R.R., Sander, B.O. International Rice Research Inst., Los, Baños, 4031 Laguna (Philippines). Soil, Water and Climate Cluster, Sustainable Impact Platform. Calub, B.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural System Cluster.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 36. 2019.*

The Philippines generates a substantial amount of rice straw and majority of the generated residue is subjected to burning. An emerging rice straw management practice that can potentially help mitigate climate change and can provide farmers additional income is the use of vermicompost technology. Many studies have shown that vermicomposting technology. Many greenhouse gases, but most are based on the rice-crops. There is a dearth of data in its effectiveness in rice-based systems, more so, in the Philippine context thus, importance of a thorough and detailed study. The objective of this study was to investigate the effects of vermicast incorporation on greenhouse gas emissions and rice yield. The experiment was conducted in two seasons accompanied with different rice straw management practice. In 2017 Wet Season, straw burning was applied to the whole field. Vermicast was incorporated two days before the transplanting date. In 2018 Dry Season, full incorporation of rice straw was implemented. No vermicast was incorporated during this period was established to check for a retention effect of the vermicast. Results have shown that regardless of the different straw management practice that were applied fro 2017WS and 2018DS, treatments with vermicast incorporation significantly reduced the CH4 emissions by 46.7% and 45.6% respectively. N20 emissions were also reduced for 2017WS (41.5%) and 2018DS (28.2%). Significantly difference in N2O emissions was only observed during the 2017WS. In terms of grain yield in 2017WS, incorporation of vermicast significantly increased the yield with an output of 4.03 +- 0.40 tons/ha compared to the control (3.41 +- 0.24 tons/ha). Implementation in farmer's field, synergy with other

technologies such as alternate-wetting and drying (AWD) and performing life cycle analysis could be ways to truly assess this technology.

RICE STRAW; COMPOSTING; OLIGOCHAETA; GREENHOUSE GASES

Q - PROCESSING OF AGRICULTURAL PRODUCTS

Q02 - FOOD PROCESSING AND PRESERVATION

Acceptability of steamed rice cake supplemented with varying amount of Lupo-lupo (Althernonthera sessilis Linn.). **Israel, P.R. Aklan State Univ., Ibajay, Aklan (Philippines). Coll. of Hospitality and Rural Resource Management. rds@asu.edu.ph.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 162. 2019.*

Rising demands for healthy food remain a challenge in society. Indigenous Lupo-Lupo or Alternanthera sesillis is a true wonder of nature. In the Philippines, it grows abundantly in fields and survives in any soil and climatic conditions. As a response to the rising demand for healthy food, this study examined the quality of steamed rice cake, supplemented with varying amounts of lupo-lupo. The study composed of four treatments with three replicates: Treatment 1, 30g of lupo-lupo in 400g ground rice; Treatment 2, 20g of lupo-lupo in 400g ground rice; and Treatment 3, 10g of lupo-lupo in 400g ground rice; Control no lupo-lupo added. The study was conducted from April to July 2018 at Aklan State University, Kalibo and Ibajay Campuses. The evaluators were Home Economics and Hotel and Restaurant students, who have experience in product development. Through sensory evaluation method, the most like product in terms of color, texture, aroma, and flavour was identified. Shelf life analysis using different storing facilities was also done through sensory evaluation. Results revealed that rice cakes which obtained the highest mean rating in all parameters were those with 10g lupo-lupo. All products were rated acceptable by the evaluations but the most dominating product was the Treatment 3, which got a score higher (color - 4.97, texture - 4.61, aroma - 4.57, flavour - 4.63) than the control group. Results of the study imply that rice cake added with a minimal amount of lupo-lupo is acceptable among the evaluators. Moreover, the product may be stored for three days in a refrigerator. If it is stored at room temperature, keeping it in a dark container is advisable. Further work to confirm the result of this investigation is recommended. Studies on utilization of lupo-lupo in other products may immensely contribute to the creation of nutritious food product, especially for health-conscious consumers.

RICE; CAKES; FOOD TECHNOLOGY; ORGANOLEPTIC ANALYSIS; ORGANOLEPTIC PROPERTIES; INDIGENOUS ORGANISMS

Collection of distinct rice-based food product recipes in Negros [Philippines]. **Canto, K.V. kv.canto@philrice.gov.ph., Seville, C.U., Parina, C.J.E., Cardova, J.A.E., Tingson, V.A., Barrato, J.M.M., Dogeno, L.G., Pajarillo, A.O. Philippine Rice Research Inst.,- Negros, Cansilayan, Murcia, Negros Occidental (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 168. 2019.*

Filipinos are known to be accommodating people, often serve meals or snacks to their guests. Rice, being a staple in the Filipino cuisine, deserves to be showcased given such kind of opportunities. Enhanced value, availability and utilization of rice into other products and by-products could potentially increase the income of households once commercialized. To acknowledge the creativity of the Negrenses, Phil Rice Negros conducted a series of cookfests using rice as the main ingredient from which recipes will be compiled to publish a rice-based cookbook. Each cookfest involved specific participants to capture a wider scope since food preference may be different in all ages and genders. Further, this would also strengthen the link between PhilRice Negros, Local Government Units and the Schools. Glutinous and brown rice are the key ingredients that had already been utilized for the cookfest. The cookfests were participated by senior high school students, institute's field workers with their family members and representative from LGUs, during the first, second and third batches respectively. Each group of participants should submit copy of ingredients with amount, total cost and procedure. Recipes that were collected included meals, snacks and desserts. Winning food products were Glulucious Snack, Coco Curry Stick Rice, Gluthie, Tama-motchi Rice Cake, Glutinous Sala Panara, Valenciana de Ebuen, Brown Garlic Rice with Sarsiadong Bola-bolang Gulay, Brown Rice with Seafoods, Brown Rice Balls and Brown Rice Cake. The most number of recipes were collected during the Lakbay Palay's Rice Festival in PhilRice Negros which were participated by the farmers from different LGUs.

RICE; FOOD PROCESSING; PROCESSED PLANT PRODUCTS; FOODS; PHILIPPINES

Effects of hot air and vacuum drying methods on drying kinetics and some quality characteristics of traditionally produced couscous in Turkey. **Celen, S. Tekirdag Namik Kemal Univ., Tekirdag (Turkey). Mechanical Engineering Dept. scelen@nku.edu.tr., Aktas, T. TekirdagxNamik Kemal Univ., Tekirdag (Turkey). Biosystem Engineering Dept.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 322-329. 2019.*

Drying kinetics and changes in some quality properties of couscous were studied to determine optimal drying method and drying temperature. Drying methods using hot air drying (HAD) and vacuum drying (VD) were applied and couscous samples were dried as thin layer at 55, 65 and 75 deg C. Pressure was set at 0.98 bar for vacuum drying. Quality parameters of color values (L*,a*,b*, chroma) and water activity values were measured. Drying periods for VD and HAD at 65 deg C were found to be similar. Lower color deviation (Delta Epsilon) and water activity values were also determined for vacuum-dried samples. The Midillietal.model was found to be the most appropriate thin layer for both HAD and VD methods.

PROCESSED FOODS; VACUUM DRYING; HOT AIR DRYING; DRYING; DRYERS; WATER DEPLETION; FOODS; PRESERVATION; TURKEY

Infusion of pineapple (Ananas comosus (L.) Merr.) wine with Rangoon creeper (Quisqualis indica L.) flower. **Orillaza, A.M.V. avorillaza@up.edu.ph., Navarro, B.R.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 361-367. 2019.*

The developed food use for underutilized Philippine flowers, the potential of Rangoon creeper (Quisqualis indica L.) flowers (RCFs) as a natural preservative applied through infusion of pineapple wine making was studied. Cabinet-dried RCFs were added at varying concentrations (0.1%, 1% and 2%) to the fermenting pineapple must at different stages (i.e., fermentation, aging and both). During fermentation, RCFs exerted an antibacterial effect regardless of concentration and an anti-yeast effect except at 0.1%. However, The RCFs showed no effect on the physicochemical properties of the fermenting must with final means of 6.0 °B total soluble solids, 10% alcohol content (v/v), and pH 3.0. Interestingly, the RCF-infused fermenting musts completed fermentation at an earlier time (2-3 d) compared with the control DPPH (2,2-diphenyl-1-picrylhydrazyl) and Folin-Ciocalteu assays of the completely fermented pineapple wine showed that RCFs generally increased the antioxidant activities of the wine, reaching values comparable to those of commercial red wine and better than those of conventional pineapple and white wines. A cost and benefit analysis of RCF infusion in pineapple wine making showed a 51.80% return on investment. With today's trend in food innovation geared toward the importance of health and wellness, RCF infusion can provide a huge market advantage targeting niche markets of health and wine connoisseurs and at the same time address the problems of wine manufacturers.

ANANAS COMOSUS; PINEAPPLES; FRUIT; FLOWERS; WINES; WINEMAKING; ALCOHOLIC FERMENTATION; PRESERVATIVES; FLOWERS; PLANT EXTRACTS

Ready-to-eat gamma-aminobutyric acid (GABA) rice meal: a healthier and nutritious calamity food. **Bulatao, R.M., Castillo M.B. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Rice Chemistry and Food Science Div. Ramos, A.M.J., Castillo, C.C., Rivero, R.O., Gantioque, G.G. Central Luzon State Univ., 3120 Science City of Muñoz, Nueva Ecija (Philippines). Coll. of Home Science and Technology. Romero, M.V. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Rice Chemistry and Food Science Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 156. 2019.*

The Philippines due to its physical environment and geographical location is highly susceptible to calamities and natural disasters like earthquakes, flash floods, and typhoons. During calamities, victims' access to nutritious foods is limited since they become reliant to relief goods which are mostly instant noodles. These kinds of calamity food cannot provide essential nutrients that are badly needed during emergency situations. To help address this concern, this study developed and characterized ready-to-eat (RTE) meal using gamma-aminobutyric acid (GABA) rice with pork adobo as viand. The study involved: (1) optimization of the formulation of GABA rice and pork adobo, (2) retorting of the final product, and (3) characterization of the nutritional content, physicochemical properties, sensory attributes, heat penetration curve, and commercial sterility of the RTE GABA rice meal adobo flavor. Results showed that 1:1 ratio of GABA rice and pork adobo had the highest rating in terms of sensory attributes. Meanwhile, 50:75 water to GABA rice ratio with no prior cooking was most preferred by the panelists. Heat penetration study revealed that retorting at 121 degrees C for 15 min and 37 sec is the optimum processing condition for RTE GABA rice meal to fully destroy the harmful Clostridium botulinum. This was evident by its passing the commercial sterility test. Consumer test showed that the RTE GABA rice meal had high degree of liking (6.28) and consumer acceptability (82%). Based on proximate analysis, the developed product had 35.4% protein, 29.0% fat, 25.0% carbohydrates, 5.1% ash, and 1.5% fiber. Therefore, the developed RTE GABA rice meal adobo flavor is an excellent healthier and more nutritious alternative calamity food.

RICE; FOODS; PROXIMATE COMPOSITION; ORGANOLEPTIC ANALYSIS; NUTRITIVE VALUE; STERILIZING; GABA

Solar-dried locally-available raw materials for food processing. **Alis, R.R. rds@asu.edu.ph., Rebustos, M.R., Abisate, K.A., Constantino, J. Aklan State Univ., Ibajay, Aklan (Philippines). Coll. of Industrial Engineering.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific

Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 163. 2019.*

Drying is one of the oldest methods of food preservation. It is still used widely to preserve food for home consumption and for marketing. In this work, eight locally-available agricultural produce (camote, giant swamp taro, cassava, taro/gabi, jackfruit seed, lemon grass, squash fruit and malunggay leaves) were dried using the Multi Commodity Solar Tunnel Dryer. Data on mean drying protocols (pre-treatment, preparation, and drying steps) were also developed and several food products were prepared from the dried raw materials. The drying temperature, taken hourly from 8 am to 4 pm daily until drying was completed, ranged from 35.4 degrees C-44.9 degrees C. The drying period ranged from 4-20 hours and the amount of moisture evaporated (percentage weight loss) ranged from 58.75% (cassava) to 88.45% (squash). Result of the proximate analysis showed that the moisture content of the dried samples ranged from 7.78 g 100g-1 (cassava) to 10.6 g 100g-1 (taro); ash content ranged from 0.82 g 100g-1 (cassava) to 8.45 g 100g-1 (malunggay leaves); crude protein content ranged from 0.85 g 100g-1 (cassava) to 10.0 g 100g-1 (jackfruit seeds); total fat ranged from 0.26 g 100g-1 (camote) to 6.35 g 100g-1 (malunggay leaves); carbohydrate and energy ranged from 48.1 g 100g-1 (malunggay leaves) to 87.4g 100g-1 (camote) and 334 kcal 100g-1 (lemon grass) to 363 kcal 100g-1 (camote), respectively. After the drying protocols were established, the dried raw materials were utilized and 10 recipes were formulated.

AGRICULTURAL PRODUCTS; NATURAL DRYING; DRYERS; PROXIMATE COMPOSITION; FOOD PROCESSING

Steam heating: a convenient and effective process to estabilize rice bran. **Bulatao, R.M., Samin, J.P.A. saminjohnpaul@gmail.com., jpa.samin@philrice.gov.ph., Castillo, M.B., Romero, M.V. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Rice Chemistry and Food Science Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 158. 2019.*

Rice bran is a nutritious and healthy by-product of rice milling. Despite its numerous health benefits, its utilization as a functional food ingredient is still very limited due to its unstable properties resulting in short shelf-life. This is mainly due to the presence of lipase that causes the rancid tasted and odor of bran. Thus, this study investigated different heat stabilization techniques for their efficiency in prolonging the shelf-life of rice bran. NSIC Rc160 bran was collected and subjected to: (a) oven drying at 60, 80, and 100 degrees C for 20, 40, 60 min; (b) infrared heating at 60, 80, and 100 degrees C for 20, 40, 60 min; (c)

microwave heating at low (1, 3, 5 min), medium (1, 2, 3 min), and high (30, 45, 60 sec) settings; and (d) steam heating for 5 to 30 min at 5 min intervals. To check the effectiveness of the different heat treatments, the free fatty acid content (FFA) and lipase activity (LA) of the stabilized rice bran before and after stabilization, and after a month of storage were determined. Although minimal difference was observed in the initial FFA content of the bran samples before and after each treatment, significant differences were noticed among the treatments after a month of storage. It was also evident that treatments with higher temperature and longer exposure lower the production of FFA. Steam healing had the highest reduction of LA by 90% (10 min), which might be due to hot air moisture applied in the samples the significantly contributed to the effective inactivation of lipase. Therefore, this study demonstrated that rice bran can be easily stabilized using a common household process without the use of complicated and expensive equipment.

RICE; BRAN; STEAMING; HEALTH FOODS; ESTERASES; FREE FATTY ACIDS; KEEPING QUALITY

Tasty and healthy: how consumers view mushroom and mushroom-based products. **Manaois, R.V., Ballesteros, R.F., Morales, A.V. av.morales@philrice.gov.ph., Abilgos-Ramos, R.G. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Rice Chemistry and Food Science Div.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 179. 2019.*

Production and processing of mushroom is widely promoted in the Philippines due to its potential in providing high quality food and additional income to farmers, local entrepreneurs, and consumers. To further enhance the marketability of mushroom in Central Luzon, this study explored consumers' perception, awareness, and purchasing behavior towards mushroom and mushroom-based products. Market survey (n=222) through personal interview was conducted in one rice-based farming community located in each of the following provinces: Aurora, Bulacan, Nueva Ecija, and Pampanga. The study group had a mean age of 46 years and 51% were women. More than half (65%) of the respondents were married, 42% reached high school level, and 40% were farmers. Survey results showed that taste and nutritional/health benefit were the attributes that had the greatest influence on consumers' decision to purchase mushroom. These were also cited as reasons of 98% of the respondents for liking mushroom. However, only 27% consume it on a regular basis, i.e. once or twice a week, due to limited availability of the commodity. When presented with a list of product concepts, majority of the consumers selected mushroom-based food supplement, coffee/tea, and cookies and other ready-to-eat snacks as highly appealing products. These findings suggest future strategies on marketing

mushroom and product development opportunities in rice-based areas in Central Luzon to further maximize its health-promoting and profit potential.

EDIBLE FUNGI; MARKET RESEARCH; MARKETING; FOOD TECHNOLOGY; CONSUMER BEHAVIOUR; PROCESSED PRODUCTS

Twelve-year-old dairy farm offers fresh milk from grass-fed cows. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (4) p. 11-14. 2021.*
https://agriculture.com.ph/2020/10/13/twelve-year-old-dairy-farm-offers-fresh-and-natural-milk-from-grass-fed-cows/

DAIRY COWS; FEEDING; DAIRY FARMS; MILK PRODUCTION; KEEPING QUALITY

Untapped potential of coconut sap vinegar. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (3) p. 62-63. 2021.*
https://agriculture.com.ph/2021/02/28/the-untapped-potential-of-coconut-sap-vinegar/

COCOS NUCIFERA; COCONUTS; SAP; YIELDS; FERMENTATION; VINEGAR

Yeast community profiling of fermenting nipa (Nypa fruticans) sap in two Philippine locations and fermentation characteristics of selected yeasts. **Madigal, J.P.T. Mariano Marcos State Univ., City of Batac, Ilocos Norte 2906 (Philippines). Bioenergy Research Center. Simbahan, J.F. Philippines Univ. Diliman, Quezon City (Philippines). Inst. of Biology. Lantican, N.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Agrupis, S. Mariano Marcos State Univ., City of Batac, Ilocos Norte 2906 (Philippines). Bioenergy Research Center. Elegado, F.B. Philippines Univ. Los Baños, College, Laguna (Philippines). National Inst. of Molecular Biology and Biotechnology. fbelegado@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (3) p. 220-229. 2019.*

Naturally fermenting nipa (Nypa fruticans) sap samples from two lambanog (palm liquor)-making sites in the Philippines were subjected to yeast community analysis. Polymerase chain reaction-denaturing gradient gel electrophoresis (PCR-DGGE) analysis revealed six yeast strains participating in nipa sap fermentation in two sites. The nipa sap samples from Pamplona, Cagayan samples showed more yeast variability compared with the Mauban, Quezon samples. The dominant yeasts are Saccharomyces cerevisiae in Mauban and Saccharomycodes spp. in Pamplona. The culturable yeast isolates were purified and categorized into four groups based on their banding patterns that were generated by means of microsatellite (GTG)5 fingerprinting. Yeast strains isolated from spontaneous nipa sap fermentations were identified by sequencing of the D1/D2 domain of the 26S rRNA

gene and the ITS1-5.8S-IT2 region, in which three were S. cerevisiae and one was Pichia kudriavzevii. These representative yeast isolates were subjected to various stress tolerance tests and evaluated for their ability to produce ethanol. P. kudriavzevii was most tolerant to pH 2.0 and 40 deg C. On the other hand, S. cerevisiae produced higher ethanol compared with P. kudriavzevii.

NYPA FRUTICANS; PICHIA; SACCHAROMYCES CEREVISIAE; YEASTS; YEAST EXTRACTS; MICROSATELLITES; FERMENTATION; PCR; PHILIPPINES

Q04 - FOOD COMPOSITION

Evaluation of physicochemical characteristics, in vitro release and antioxidant properties of beta-carotene and beta-cyclodextrin inclusion complexes with rice as food matrix. **Dela Cruz, J.D., Flores, F.P. Philippines Univ. Los Baños College, Laguna (Philippines). Inst. of Food Science and Technology. fpflores@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (4) p. 337-348. 2020.*

The goal of this research was to prepare inclusion complexes with beta-carotene and beta-cyclodextrin as viable fortificants via physical blending (PB), kneading (K), and co-precipitation (CP). The physicochemical characteristics (inclusion efficiency, yield, antioxidant activities, FTIR spectra, scanning electron micrographs) besides in vitro release and antioxidant properties of the complexes were evaluated with rice as food matrix. CP and PB solids exhibited highest inclusion efficiency (83%) and yield (100%), respectively. Fourier Transform Infrared Spectroscopy (FTIR) spectra revealed changes in intensity, position, and number of peaks in beta-cyclodextrin and beta-carotene, confirming guest-host interactions in inclusion complexation. Scanning electron micrographs showed heterogeneous particles of beta-carotene and beta-cyclodextrin in PB but homogeneous solids in K and CP complexes. Simulated in vitro digestion showed burst release of beta-carotene in PB complexes. Food matrix appeared to synergistically affect release and antioxidant properties. K and CP complexes exhibited sustained radical scavenging activity and ferric reducing power, respectively, and may be recommended for further applications.

RICE; CAROTENOIDS; DEXTRINS; CHEMICOPHYSICAL PROPERTIES; ANTIOXIDANTS; IN VITRO; ENCAPSULATION; KNEADING; VITAMIN DEFICIENCIES; MIXING

Infusion of pineapple (Ananas comosus (L.) Merr.) wine with Rangoon creeper (Quisqualis indica L.) flower. **Orillaza, A.M.V. avorillaza@up.edu.ph., Navarro, B.R.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 361-367. 2019.*

The developed food use for underutilized Philippine flowers, the potential of Rangoon creeper (Quisqualis indica L.) flowers (RCFs) as a natural preservative applied through infusion of pineapple wine making was studied. Cabinet-dried RCFs were added at varying concentrations (0.1%, 1% and 2%) to the fermenting pineapple must at different stages (i.e., fermentation, aging and both). During fermentation, RCFs exerted an antibacterial effect regardless of concentration and an anti-yeast effect except at 0.1%. However, The RCFs showed no effect on the physicochemical properties of the fermenting must with final means of 6.0 °B total soluble solids, 10% alcohol content (v/v), and pH 3.0. Interestingly, the RCF-infused fermenting musts completed fermentation at an earlier time (2-3 d) compared with the control DPPH (2,2-diphenyl-1-picrylhydrazyl) and Folin-Ciocalteu assays of the completely fermented pineapple wine showed that RCFs generally increased the antioxidant activities of the wine, reaching values comparable to those of commercial red wine and better than those of conventional pineapple and white wines. A cost and benefit analysis of RCF infusion in pineapple wine making showed a 51.80% return on investment. With today's trend in food innovation geared toward the importance of health and wellness, RCF infusion can provide a huge market advantage targeting niche markets of health and wine connoisseurs and at the same time address the problems of wine manufacturers.

ANANAS COMOSUS; PINEAPPLES; FRUIT; FLOWERS; WINES; WINEMAKING; ALCOHOLIC FERMENTATION; PRESERVATIVES; FLOWERS; PLANT EXTRACTS

Physicochemical and quality properties of pumpkin (Cucurbita moschata Duch.) jam, marmalade and fruit leather. **Seymen, S., Ozcan-Sinir, G., Copur, O.U. Bursa Uludag Univ.16059 Nilufer, Bursa (Turkey). Dept. of Food Engineering. ucopur@uludag.edu.tr.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (3) p. 275-281. 2020.*

Pumpkin, a fruit that is rich in mineral, vitamin and fiber, is good for a healthy diet. The aim of this study to produce jam, marmalade and fruit leather from pumpkin (Cucurbita moschata Duch.) and examine the physicochemical and quality properties of the products such as hydroxymethylfurfural (HMF), total phenolic content, total antioxidant capacity, total sugar, organic acid composition, pH, water-soluble dry matter and moisture. The highest acid content was determined in fruit leather (4.29%), followed by marmalade (0.24%) and jam (0.24%). Pumpkin marmalade (39.07 mg/kg) contained a high level of hydroxymethylfurfural compared with fruit leather (30.96 mg/kg) and jam (17.56 mg/kg), while the total phenolic content of marmalade, jam and fruit leather was 71.92, 63.33 and 113.23 mug gallic acid equivalent (GAE) 100 g/dw, respectively. Pumpkin marmalade had the highest antioxidant capacity of 13.05 mumolTrolox equivalent (TE) g/dw.

CUCURBITA MOSCHATA; PUMPKINS; NUTRITIVE VALUE; FOOD COMPOSITION; CHEMICOPHYSICAL PROPERTIES; PHENOLIC CONTENT; HMF; TANNINS; QUALITY; FRUIT PRODUCTS; JAMS

Physicochemical and sensory characteristics of three varieties of shrunken 2 sweet corn (Zea mays L.) as affected by harvest maturity and period of storage. **Evangelista, G.C. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Human Nutrition and Food. Israel, K.A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Food Science and Technology. Barrion, A.S.A. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Human Nutrition and Food.** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 41-57. 2017.*

Optimum harvest maturity and storage time of sweet corn are important for farmers to maximize profit by selling good quality produce. In this study, these parameters were determined by evaluating the physicochemical and sensory characteristics of three commercial varieties of shrunken 2 sweet corn as affected by harvest maturities (18, 20 and 22 days after 100% silking) and period of storage (1,3,5 days). As harvest maturity was extended, mass, total soluble solids and force gauge values generally increased while tenderness decreased. Conversely regardless of variety, the mass, TSS, tenderness and sensory characteristics decreased while mass loss and hardness increased with period of storage. Period of storage had negative correlations with TSS and sensory characteristics. On the other hand the more tender the kernel, the sweeter, juicer and more acceptable it was. No substantial relationship was found between TSS and perceived sweetness and tenderness. On the other hand, vitamin A content was not affected by harvest maturity. The results of the study showed that harvest maturity and period of storage had an effect on some of the physicochemical and sensory characteristics of sweet corn while the physicochemical and sensory characteristics also affect each other.

ZEA MAYS; MAIZE; VARIETIES; STORAGE; TIME; HARVESTING; MATURITY; ORGANOLEPTIC PROPERTIES; CHEMICOPHYSICAL PROPERTIES

Phytochemical properties, antioxidant activities, and cytotoxicity of ethanolic bran extracts from Philippine pigmented rice cultivars. **Bulatao, R.M. rmbulatao@philrice.gov.ph., rudy_macky@yahoo.com., Samin, J.P.A., Huliganga, R.C., Tubera, R.P. Philippine Rice Research Inst., Nueva Ecija (Philippines). Rice Chemistry and Food Science Div. Feliciano, M.A.M., Ortinero, C.V. Central Luzon State Univ., Nueva Ecija (Philippines). Dept. of Chemistry.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. v. 103 (4) p. 293-302. 2020.*

Antioxidants are widely recognized for their immune-enhancing and disease-preventing properties. However, there are some reports that certain synthetic antioxidants can pose carcinogenic effects on human cells. Therefore, it is vital to look for an alternative source of natural, effective, and safe antioxidants for human consumption. In this study, ethanolic extracts of six pigmented rice bran samples were evaluated for their phytochemical properties, antioxidant activities, and cytotoxicity against normal human blood lymphocytes (NHBL). Results showed that the pigmented rice bran extracts had high total phenolic (70.1–178.4 mg/g gallic acid equivalent), flavonoid (123.3–378.0 mg/ rutin hydrate equivalent), and anthocyanin (0.8–152.5 m/g cyanidin-3-glucoside) content. They also had strong antioxidant activities that ranged from 116.4 to 461.7 mg/g trolox equivalent (TE) for ferric reducing antioxidant power (FRAP) and 85.4–367.7 mg.g-1 TE for 2,2'-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid) radical cation scavenging activity (ABTS-RCSA). All sample extracts showed low levels of effective concentration (EC) at 50 (EC50) (11.6–30.3 mg/L) and 25 (EC25) (1.2–10.1 mg/L), which is a good indication of high antioxidant activities. Pearson’s correlation analysis revealed that there was a moderate to very strong positive correlation (R value: 0.623–0.993) among the phytochemical properties and antioxidant activities tested. Furthermore, pigmented rice bran extracts (100–1000 ppm) showed no toxic effect against NHBL, which implies that all samples are safe for human consumption. Therefore, pigmented rice bran extracts can be used as key ingredient in the development of safe and effective functional food and pharmaceutical products.

RICE; BRAN; EXTRACTS; ANTIOXIDANTS; FREE RADICALS; TOXICITY; PHILIPPINES; CHEMICOPHYSICAL PROPERTIES

Profiling of the volatile compounds of the different local coffee cultivars through headspace-gas chromatography-mass spectrometry. **Marquez, K.P. Philippines Univ. Los Baños College, Laguna (Philippines). Inst. of Chemistry. kgperez3@up.edu.ph., Mojica, R.M. Cavite State Univ., Indang, Cavite (Philippines). National Coffee Research Development and Extension Center.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. 103 (4) p. 349-356. 2020.*

The study sought to provide the data necessary for the identification, authentication, and quality analysis of coffee products cultivated locally. Four varieties of locally cultivated coffee beans (Arabica, Robusta, Excelsa, and Liberica) were analyzed for their respective aroma profiles using Headspace – Gas Chromatography – Mass Spectrometry. For the aroma profiles, a total of 66 compounds were detected across varieties and roasting degrees based on the National Institute of Standards and Technology (NIST) Library Search Engine. An 85% mass spectral profile match percentage served as the main criteria. The aroma profiles were analyzed to differentiate the varieties and their respective roasting degrees quantitatively through the varying amounts of the volatile compounds emitted as

aroma, and to determine the effects of roasting on the resulting composition of such components.

COFFEA; VARIETIES; COFFEE BEANS; FATTY ACIDS; GAS CHROMATOGRAPHY; MASS SPECTROMETRY; FLAVOUR COMPOUNDS; ROASTING; IDENTIFICATION

Q05 - FOOD ADDITIVES

Evaluation of physicochemical characteristics, in vitro release and antioxidant properties of beta-carotene and beta-cyclodextrin inclusion complexes with rice as food matrix. **Dela Cruz, J.D., Flores, F.P. Philippines Univ. Los Baños College, Laguna (Philippines). Inst. of Food Science and Technology. fpflores@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 103 (4) p. 337-348. 2020.*

The goal of this research was to prepare inclusion complexes with beta-carotene and beta-cyclodextrin as viable fortificants via physical blending (PB), kneading (K), and co-precipitation (CP). The physicochemical characteristics (inclusion efficiency, yield, antioxidant activities, FTIR spectra, scanning electron micrographs) besides in vitro release and antioxidant properties of the complexes were evaluated with rice as food matrix. CP and PB solids exhibited highest inclusion efficiency (83%) and yield (100%), respectively. Fourier Transform Infrared Spectroscopy (FTIR) spectra revealed changes in intensity, position, and number of peaks in beta-cyclodextrin and beta-carotene, confirming guest-host interactions in inclusion complexation. Scanning electron micrographs showed heterogeneous particles of beta-carotene and beta-cyclodextrin in PB but homogeneous solids in K and CP complexes. Simulated in vitro digestion showed burst release of beta-carotene in PB complexes. Food matrix appeared to synergistically affect release and antioxidant properties. K and CP complexes exhibited sustained radical scavenging activity and ferric reducing power, respectively, and may be recommended for further applications.

RICE; CAROTENOIDS; DEXTRINS; CHEMICOPHYSICAL PROPERTIES; ANTIOXIDANTS; IN VITRO; ENCAPSULATION; KNEADING; VITAMIN DEFICIENCIES; MIXING

Q55 - FEED ADDITIVES

Effects of Moringa oleifera leaf meal on plasma ghrelin and insulin-like growth factor-1 levels in swine and its potential role in improving sow productivity. **Gonzales, R.K.E.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. rbgonzales5@up.edu.ph., Abina-Artuz, I.R. Department of Agriculture, Provincial Government of Bataan (Philippines). Adiova, C.B., Rayos, A.A., Vega, R.S. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Animal Science.** *Philippine Agricultural*

Scientist (Philippines). Formerly The Philippine Agriculturist. 0031-4454. v. 102 (4) p. 279-289. 2019.

Two experiments were conducted to determine the possible role of Moringa oleifera on sow productivity and ghrelin-growth hormone (GH)/insulin-like growth factor-1 (IGF-1) metabolic pathway. in the first experiment, the effects of 15% M. oleifera leaf meal (MoLM) inclusion in the diet on the plasma ghrelin and IGF-1 levels were determined using four sexually mature gilts with indwelling catheter. Results showed that plasma ghrelin and IGF-1 levels between the control and experimental groups were not statistically different, although pigs fed with MoLM had apparently lower baseline and higher amplitude of plasma ghrelin levels particularly a few hours right after feeding time. on the other hand, IGF-1 level in pigs fed with MoLM seemed down regulated. the second experiment aimed to know the effects of supplementing 15% MoLM on body condition and sow productivity during the week of gradual feed withdrawal prior to farrowing. A total of 16 sows with 141 piglets were used. Although the experimental group registered higher values, the difference in backfat losses from the control group is not statistically significant. The same results were observed for the corresponding piglets; despite higher weaning weight and average daily gain, the control group was not statistically different from the experimental group. The results showed the potential of 15% MoLM in improving sow productivity through ghrelin – GH/IGF-1 metabolic pathway. Further studies are recommended with longer duration of supplementation. These are also recommended to isolate the potential component in MoLM that improves milk production because the high fiber in MoLM possibly contradicts ghrelin release in the stomach.

MORINGA OLEIFERA; LEAF MEAL; SWINE; SOWS; INSULIN-LIKE GROWTH FACTOR; SUPPLEMENTS; FEED ADDITIVES; PRODUCTIVITY; APPETITE

Q70 - PROCESSING OF AGRICULTURAL WASTES

Local brand creates eco-friendly clothes made of katsa to lessen waste. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (1) p. 32. 2021.*
https://agriculture.com.ph/2020/09/17/a-local-brand-creates-eco-friendly-clothes-made-of-katsa-to-lessen-wastes-and-to-promote-old-filipino-custom/

WASTES; RECYCLING; SUSTAINABILITY; ENVIRONMENTAL IMPACT; USES

S - HUMAN NUTRITION

S01 - HUMAN NUTRITION - GENERAL ASPECTS

Development and validation of scale to measure the knowledge of Filipino Barangay [Village] Nutrition Scholars on infant and young child feeding counseling. **Sacdalan-Africa, L. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Human Nutrition and Food. lsafrica@up.edu.ph., leila.sacdalan@ui.ac.id., Mansyur, M. Universitas Indonesia, Jakarta (Indonesia). Muslimatun, S. Indonesia International Inst. for Life Science (i3L)) Jakarta (Indonesia). Barba, C.VC.. World Bank Program, Manila (Philippines).** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 93-112. 2017.*
https://jhes.uplb.edu.ph/articles/development-and-validation-of-scale-to-measure-the-knowledge-of-filipino-barangay-nutrition-scholars-on-infant-and-young-child-feeding-counseling/

The Barangay (Village) Nutrition Scholars (BNS) has been trained to do infant and young child feeding (IYCF) counseling but the absence of a validated knowledge test instrument limited the practice of knowledge assessment and pose question if they know the correct information for their client. The purpose of the study was to develop a psychometrically sound measure for BNS knowledge assessment on IYCF counseling. True or false, fill-in- the-blanks and multiple-choice items were developed based on the training manual on IYCF counseling and other existing pre- and post-tests about this subject. An instrument with 38 items was pilot tested by a sample of 320 BNS. The item was increased to 47 through item analysis and was field-tested by a sample of 280 BNS. Exploratory factor analysis (EFA) using the pilot test data identified a two-factor model and 20 acceptable items for measuring recall and understanding. Confirmatory factor analysis (CFA) using the field test data supported the two-factor model (X2 (89) =97; p=0.27) but only with 15 acceptable items. Content validation using the study blue print necessitated the addition of seven meaningful items. Validity indices were adequate while internal consistency was desirable based on final analysis. The scale to measure knowledge of BNS on IYCF counseling is psychometrically sound and could be used to provide better judgments and explanation about the effectiveness of IYCF training and counseling, respectively.

INFANTS; INFANT FEEDING; NUTRITIONAL STATUS; STUDENTS; DIFFUSION OF INFORMATION

Diet diversity, nutrition and health status of cargo truck drivers in Batangas City, Philippines. **Villanueva, F.N.B., Barrion, A.S.A. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Human Nutrition and Food.** *Journal of Human Ecology (Philippines). 2244-0607. v. 6 (1) p. 1-11. 2017.*

https://jhes.uplb.edu.ph/articles/diet-diversity-nutrition-and-health-status-of-cargo-truck-drivers-in-batangas-city-philippines/

Road safety has been a major public health concern. Driver error is identified as one of the major causes of road crash accidents. The reported poor driving performance of drivers may be attributed to their current nutrition and health conditions. The study was conducted to assess the nutritional and health status of selected cargo truck drivers in Batangas City [Philippines] and determine the individual diet diversity scores of truck drivers. Almost 70% of the respondents had normal nutritional status based on their body max index (BMI). Majority of the respondents did not engage in any type of exercises and were current smokers and alcohol drinkers. Except for iron, the mean adequacy ratio (MAR) of nutrient intake of the subjects was noted to be inadequate (< 80%). Individual diet diversity scores (DDS) were measured as moderate, with 5 out of the 9 food groups.

WORKERS; HEALTH; NUTRITIONAL STATUS; NUTRIENT AVAILABILITY; PHILIPPINES

T - POLLUTION

T01 - POLLUTION

Concentration and source of trace metals in street dust from an industrial city in semi-arid area of China. **Xiufeng Han. Shaanxi Normal Univ., Xi'an 710119, P.R. (China). Dept. of Environmental Science. Dongqi Shi, Xinwei Lu. College of Resources and Environment, Baotou 014030, P.R. (China). luxinwei@snnu.edu.cn.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 90-99. 2018.*

The concentrations of trace metals in street dust of Baotou, an industrial city in semi-arid area of northwest China, were determined by X-ray fluorescence spectrometry. Sources of trace metals analyzed in the dust were identified based on their concentrations, enrichment factor and multivariate statistical analysis. The results indicate that the street dust of Baotou has elevated concentrations of Ba, Co, Cr, La, Pb and Sr, which are 1.2–4.7, 4.0–10.7, 1.7–5.8, 1.0–5.1, 1.2–8.7 and 1.5–2.6 times the background values of local soil, respectively. Cr, Pb, Ba, La and Sr in the dust were moderately enriched, while Co was significantly enriched. Cu and Zn had low concentrations to moderately enriched. Other determined trace metals were of low concentrations to minimally enriched. Hf, Zr, Ti, Y, Th, U and Ni mainly originated from natural sources. Ga, Sr and Co are primarily derived from industry and construction sources. La, Mn, V, Cr, Ba, Pb, Cu and Zn have mixed natural, industrial and traffic sources.

DUST; METALS; INDUSTRY; TOWNS; SEMIARID CLIMATE; STATISTICAL METHODS; AIR POLLUTION; CHINA

Effect of particulate matter on visibility in Hangzhou, China. **Jian Wu, Wen Chu. Xi'an Univ. of Technology, Xi'an (China). Huijian Lu, Yao Shi, Yi He. Zhejiang Univ., Hangzhou (China). Key Lab. of Biomass Chemical Engineering of Ministry of Education.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 100-109. 2018.*

Hangzhou, a humid subtropical city of China, was studied to investigate the effect of particulate matters (PMs) and its fractions (e.g., PM2.5 and PM2.5 approx 10) and levels of relative humidity (10 to >90%) on atmospheric visibility. It was found that finer fractions of PM have greater negative effect on visibility. This inverse relationship was pronounced during winter season, having the highest PM2.5 concentrations and the lowest visual range. Summer season exhibited the highest visual range and least PM2.5 fractions, along with autumn. Furthermore, lower relative humidity coincides with higher visual range regardless of the PM fractions. As the levels of relative humidity went up (>90%), lower values of visual range were measured. The results from this study suggest that lower target levels of PM2.5 is needed for Hangzhou in order to prevent episodes of poor visibility.

AIR POLLUTION; ATMOSPHERE; VISIBILITY; RELATIVE HUMIDITY; CHINA

Lead bioaccumulation and tolerance of Andrographis paniculata (Burm. F.) Nees. **Belonias, T.D.S., ted.belonias@vsu.edu.ph., Dionisi o-Sese, M.L. mdsese@up.edu.ph.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 161. 2019.*

Andrographic paniculata, commonly called 'sinta' or 'King of Bitters' is a common medicinal plant characterized by a highly bitter taste in all its plant parts. In this study, A. paniculata plants were grown in soils added with increasing concentrations of lead in order to assess its lead bioaccumulation potential and tolerance. This pot experiment conducted at the Visayas State University from August to December 2018, was laid out in Completely Randomized Design with 200, 400, 600, 800 and 1000mg/L as treatments. Results show that A. paniculata is tolerant to high levels of lead (Pb) in the soil. The plant did not show visual symptoms of Pb toxicity even at the highest concentration of 1000 mg/L lead added to the soil. More than 70% of the total lead absorbed by the plant accumulated in the roots and only small fractions were translocated to the stems and leaves suggesting a possible heavy metal exclusion strategy under lead stress. As the concentration of lead added to the soil

was increased, the amount of lead in the plant tissues also increased. The bioaccumulation factor, translocation factor and metal extraction ratio values of the plant were less than 1.0, which signify that A. paniculata is not an efficient lead phytoextractor to clean lead-contaminated soils. This is because even if it can absorb high levels of lead, much of it is retained in the roots and only a fraction is translocated to the aboveground parts.

DRUG PLANTS; LEAD; BIOACCUMULATION; TOLERANCE; STRESS; LEAVES; STEMS; TRANSLOCATION

Lead biomagnification in a food web of the open waters along Sta. Rosa Subwatershed, Philippines. **Tingson, K.N. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Forestry and Natural Resources. kntingson1@up.edu.ph. Zararalla, M.T., Macandog, D.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Arts and Sciences. Rañola, R.F. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Economics and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 110-119. 2018.*

Contamination of lead in fishes from Laguna de Bay [Los Baños, Philippines] was previously recorded to have the highest concentrations that may pose a hazard to human health. However, no previous study was conducted on its biomagnification. This research is the first exploratory study that examined lead biomagnification in a food web of the lake. Water quality, aquatic communities, trophic levels and lead concentrations were analyzed during the dry and wet seasons. Lead concentrations were analyzed using Atomic Absorption Spectrometry. Levels of lead in the water were 0.05 mg/L and 0.03 mg/L for dry and wet seasons, respectively. Lead concentrations increased in phytoplankton with 3.87 and 9.66 mg/kg lead during wet and dry season, respectively. Furthermore, lead levels increased in zooplankton with 2.92 and 14.31 mg/kg during wet and dry seasons, respectively. In fishes, the highest lead concentration in dry season was detected in Hypophthalmichthys nobilis with 0.38 mg/kg while the highest during wet season was observed in Oreochromis niloticus with 0.67 mg/kg. Lead biomagnification was observed in this study in the following order: water < phytoplankton < zooplankton. However, this increasing trend did not continue up to fishes.

WATERSHEDS; LEAD; BIOACCUMULATION; CONTAMINATION; WATER POLLUTION; WATER QUALITY; PHILIPPINES

Spectrochemical analysis of tissues of frog Dryophytes plicatus tadpoles (Amphibia: Hylidae) developing under lead and iron pollution. **Aguillon-Gutierrez, D.R. Universidad Juarez del Estado de Durango, Av. Universidad s/n. Fracc, Filadelfia, C.P. 35010, Gomez Palacio, Durango (Mexico). Facultad de Ciencias Biologicas. Ramirez-Bautista, A. Universidad**

Autonoma del Estado de Hidalgo, Ciudad del Conocimiento, Carretera Pachuca-Tulacingo km. 4.5, Colonia Carboneras, C.P. 42184, Mineral de la Reforma, Hidalgo (Mexico). Laboratorio de Ecologia de Poblaciones. Romo-Gomez, C. Universidad Autonoma del Estado de Hidalgo, Pachuca, (Mexico). Centro de Investigaciones Qimicas. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 74-81. 2018.*

This study conducted a bioassay on frog tadpoles of the Mexican endemic species Dryophytes plicatus exposed to lead and iron. This species was used because some of its populations live near urban areas that may exposed them to pollutants, such as heavy metals due to industrial processes or mining industry. Specimens in a post-embryonic stage of Dryophytes plicatus were collected in water bodies near El Chico National Park. For the bioassay, the collected samples were grouped into three namely; tadpoles in contact with steel cloves (99% Fe, 1% C); the second group in contact with lead plates; and the last was the control group (without heavy metals). A spectrochemical analysis was held to identify the concentrations of these elements in the liver, intestines, and gills. This study shows that Dryophytes plicatus can bioaccumulate these heavy metals in their tissues, particularly in the liver and the intestine. The concentration of lead and iron was similar in both the control and experimental groups, due to the use of tap water of a mining place, but the concentration in the tadpoles tissues indicates a bioaccumulation process.

FROGS; TISSUE ANALYSIS; LEAD; IRON; BIOASSAYS; WATER POLLUTION; BIOACCUMULATION

T10 - OCCUPATIONAL DISEASES AND HAZARDS

Seismic audit of important UPLB [University of the Philippines Los Banos] buildings towards an earthquake resilient campus. **Zafra, R.G. Philippines Univ. Los Banos, College, Laguna (Philippines). Dept. of Civil Engineering.** Dr. Senen M. Miranda Professorial Chair in Civil Engineering. Via online (Zoom meeting platform). 30 Sep 2021.

The seismic hazard potential brought not only by the West Valley Fault but by other active faults in the region poses an urgent need to conduct a seismic audit of important UPLB buildings. The study summarizes the results of the preliminary seismic audit of academic, administration, and service buildings performed based on a previously conducted seismic risk assessment of 67 out of the total 165 UPLB buildings. However, due to the unavailability of structural plans for some of the buildings, thirteen out of 147 buildings deemed to have medium risk were considered. The buildings were evaluated for a Life Safety performance level except for the UHS Main Building which was evaluated for Immediate Occupancy performance level. Based on the results of the study, most of the audited buildings built before 1977, considered as pre-code buildings, have structural

elements that did not pass the required performance level. The two audited buildings built after 1992, considered as benchmark buildings, have passed the required performance level. The two audited buildings built after 1992, considered as benchmark buildings, have passed the required performance level may need retrofit of columns, beams, and foundation. Because of the limitations of the analysis (i.e. assumed material properties not verified by destructive/non-destructive tests, soil type assumed to be Soil Type D for the entire UPLB campus), the buildings with identified deficiencies can be prioritized for financial assessment taking into account the results of material and geotechnical investigations. The results of the seismic audit can be used in the preparation of an earthquake disaster mitigation plan of the university that should be put into place to make campus buildings safe in earthquakes and more resilient to earthquake damage and disruption.

EARTHQUAKES; DISASTER PREPAREDNESS; DISASTER PREVENTION; BUILDINGS; EDUCATIONAL INSTITUTIONS; PHILIPPINES

U - METHODOLOGY

U10 - MATHEMATICAL AND STATISTICAL METHODS

Evaluation of leafhopper performance in eggplant using image processing techniques. **Magnaye, A.V. avmagnaye@up.edu.ph., Madrid, V.R.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Computer Science. vmmadrid@up.edu.ph., Taylo, L.D. ldtaylo@up.edu.ph., Cainday, J.T. jtainday@up.edu.ph., Hautea, D.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. dmhautea@up.edu.ph.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 173-174. 2019.*

Feeding damage of leafhopper, Amrasca biguttula (Ishida) poses a threat in eggplant production as early as one month after transplanting. Yield loss due to feeding damage can reach 50% at high infestation rate. Leafhopper is a phloem sap feeder causing yellowing of leaf margin, drying-up of leaves, resulting to hopperburn condition that may lead to stunted plant growth. Monitoring of feeding damage among eggplant germplasm to identify the individual plants with resistance to the leafhopper was usually done on a weekly basis. The procedure required counting the leafhoppers per 3leaf samples of 5 plants and damage scoring the plant. An innovation was done to screen eggplant entries by automatically taking photos, recording, and counting the leafhoppers that alighted on the leaves. This study used cameras, such as network/IP/USB webcams, that are controlled by a computer.

This study designed an image capture setup (with the camera placed at the base of the plant) and developed a computer program that would connect to the camera and automate the counting of leafhoppers. The image processing techniques used are image contrast enhancement to isolate the leafhoppers from the leaves and binarize the image using adaptive threshold to extract and count the leafhoppers present.

SOLANUM MELONGENA; AUBERGINES; CROP LOSSES; AMRASCA BIGUTTULA; FEEDING PREFERENCES; EVALUATION; IMAGE PROCESSING; IMAGERY

Mid-infrared spectroscopy and partial least-square regression for predicting soil properties in Philippine Coffee forms. **Umali, B.P. bpumali@gmail.com., Flores, J.A. fa0022j@gmail.com., Vodoña, B.S. bessvidena@gmail.com., Garcia, K.R.S. krisgarcia70@gmail.com., Rivera, A.F. Cavite State Univ., Indang, Cavite (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 176. 2019.*

The potential of mid-infrared (MIR) spectroscopy coupled with partial least-squares (PLS) was investigated to predict several soil properties in Philippine coffee farms. Key soil properties including soil organic matter (OM), available Phosphorous (P), exchangeable Potassium (K), electrical conductivity (EC), pH, and clay content were measured and predicted. A diffuse reflectance Fourier transform infrared (FTIR) spectrometer was used to acquire spectral data of soils collected from different coffee-producing provinces in the country. The spectral data were explored under different pre-processing techniques, namely - multiplicative scatter correction, standard normal variate, and Savitzky-Golay filter. The resulting spectral data from each pre-processing techniques were then used individually for the PLS model development. Different PLS models for each soil property were compared with the best prediction model selected based on coefficient of determination (R2) and root mean square error (RMSE). With the selected PLS models, several soil properties were predicted with acceptable results (R2 = 0.66 to 0.83) including soil pH, OM content, and clay content. In contrast, the PLS models developed for soil EC, available P and exchangeable K have relatively weaker prediction performances (R2 = 0.06 to 0.56). The result of this study suggests a potential approach that can be used to rapidly assess the soil nutrient in Philippine coffee farms.

COFFEA; FARMS; SOIL CHEMICOPHYSICAL PROPERTIES; SPECTROMETRY; METHODS; PHILIPPINES

Statistical modeling of crop-weather relationship in India: a survey on evolutionary trend of methodologies. **Paltasingh, K.R. NALSAR Univ., of Law, Hyderabad (India). kirtti@nalsar.ac.in., Goyari, P. Texas Christian Univ., Fort Worth, Texas (USA). phanin12@gmail.com.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 15 (1) p. 43-60. 2018.*
https://ajad.searca.org/article?p=683

Weather factors, like other inputs such as land, labor, seeds, irrigation, fertilizer, and pesticides are also direct inputs in crop production. In a state of agriculture where the adoption and diffusion of modern technologies is very low or almost nil, weather factors count more than other inputs because of their direct and indirect effects. Thus, the link between weather and crop yield will have implications on food supply and crop forecasting and management policies. It is of immense importance to the policymakers, agricultural scientists, agricultural economists, and meteorologists to understand this relationship. The methodology for studying this relationship has undergone many improvements over time. This paper attempts to review the studies in this area done in India and a few from abroad that brought an evolution in the methodology of crop-weather modeling.

CROPS; WEATHER; MODELS; PLANT PRODUCTION; FOOD SUPPLY; FORECASTING; INDIA

U30 - RESEARCH METHODS

Potential of using unmanned aircraft systems for landslide monitoring: the case of Janowiec landslide in Poland. **Cmielewski, B. Wroclaw Univ. of Technology, LabScan3D, ul. Boleslawa Prusa 55/55, 50-317 Wroclaw (Poland). bartolomiej.cmielewski@pwr.edu.pl., Dabek, P.B. Wroclaw Univ. of Envoronmental and Life Science, LabScan3D, ul. Boleslawa Prusa 55/55, 50-317 Wroclaw (Poland). Inst. of Environmental Development and Protection. Patrzalek, C. Wroclaw Univ. of Envoronmental and Life Science, LabScan3D, ul. Boleslawa Prusa 55/55, 50-317 Wroclaw (Poland). Dept. of Spatial Economy. Wilczynska, I. Wroclaw Univ. of Envoronmental and Life Science, LabScan3D, ul. Boleslawa Prusa 55/55, 50-317 Wroclaw (Poland). Inst. of Geodesy and Geo.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 8-25. 2018.*

One of the first visible signs of landslide occurrence is changes in microrelief of the slope. In the classical landslide monitoring procedure to determine the land deformation, direct surveys are used. To get accurate and actual information about the object, the ultrahigh resolution unmanned aerial systems imagery can be applied. A digital surface model can be developed and utilized to create a high-resolution orthophotograph as well as a point cloud, which can be used to develop a digital terrain model. Pictures taken by unmanned aerial vehicles have a ground resolution of a pixel on the level of single centimetres. This type of

cartometric material is developed in short time and allows to specify the landslides range and features, and in evaluating the mass movement. Cyclical measurements also allow to determine the resulting deformation although it should be noted that the accuracy of survey depends on the vegetation process. In this study, the methodology of landslide monitoring using unmanned aerial systems as well as comparative analyses to the other techniques such as terrestrial laser scanning or airborne laser scanning, were presented.

EQUIPMENT; LANDSLIDES; AERIAL APPLICATION; AERIAL SURVEYING; LASERS; MONITORING; POLAND; PHOTOGRAPHY

Visible and shortwave near-infrared spectroscopy for rapid sugarcane quality testing. **Rosales, J.H., Yaptenco, K.F. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Agricultural Engineering. Agoncillo, M.C.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural and Machinery Testing and Evaluation Center.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 23. 2019.*

Reliable in-field quality measurement techniques are needed in the sugarcane industry since conventional technologies employed for sugarcane quality assessment are mostly done in the laboratory, requiring complex sample preparation and testing procedures. Development of a rapid, non-destructive and efficient mode of measurement which can be performed directly on sugarcane stalk samples is highly desirable. In this study, the potential of visible (Vis) and shortwave near-infrared (NIR) spectroscopy coupled with chemometrics to measure sugarcane quality parameters like Brix and moisture content of different sugarcane high yielding varieties was investigated on October to December 2018 in the Agricultural and Bio-Process Division, College of Engineering and Agro-Industrial Technology, UPLB [University of the Philippines Los Baños]. Diffuse reflectance spectra of sugarcane stalks coming from top and bottom internode sections were acquired by direct skin scanning method using Vis-NIR and NIR spectrometers at a wavelength range of 400nm to 1000nm, and 900nm to 1700nm, respectively. Reference data of Brix and moisture content were measured using handheld refractometer and oven-drying, respectively. Multivariate analyses such as principal component analysis and partial least squares regression (PLSR) were employed to interpret and relate spectral and reference data; forming classification and prediction models. PLSR models derived from NIR spectra showed good performance in predicting Brix and moisture content, with coefficient of determination, R2=0.49 and R2=0.597, respectively. Whereas for Vis-NIR spectra, generated models have R2=0.49 and R2=0.50 in predicting Brix and moisture content, respectively. Higher prediction accuracy was achieved when NIR spectra were used. Results only proved

that Vis-NIR spectroscopy is potentially useful for the rapid and non-destructive measurement of sugarcane quality.

SACCHARUM OFFICINARUM; VARIETIES; SUGARCANE; QUALITY; EVALUATION; CHEMICOPHYSICAL PROPERTIES; SPECTROMETRY

U40 - SURVEYING METHODS

Assessment of aquifer vulnerability in Baghmalek plain in Khuzestan, Iran using GIS [Geographical Information System] DRASTIC model. **Galareh, R., Islamic Azad Univ., Ahvaz (Iran). Dept. of Water Sciences and Engineering. Kashkuli, H., Zohrabi, N. Islamic Azad Univ., Ahvaz (Iran). Dept. of Water Sciences and Engineering. nargeszohrabi@gmail.com.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (1) p. 26-35. 2018.*

The purpose of this study was to assess the vulnerability of groundwater in Baghmalek aquifer to pollution. The groundwater vulnerability was simulated in Geographical Information System (GIS) using DRASTIC model. Indeed, GIS clarifies the results of a complicated model through visual representation, which provided an applicable tool for decision makers. The vulnerability map of Baghmalek basin shows four classes including no risk to pollution, very low vulnerability, low vulnerability, and low to moderate vulnerability depending on the intrinsic characteristics. The results of the model indicate that the northern parts of the plain are more vulnerable than the southern parts.

GROUNDWATER; GROUNDWATER TABLE; WATER POLLUTION; GEOGRAPHICAL INFORMATION SYSTEMS; MODELS; IRAN ISLAMIC REPUBLIC

Defining optimal geographic insurance units for weather index-based insurance in the Philippines. **Alcaide, K.D.R., Lansigan, F.P. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 8. 2019.*

The study focused on establishing the most efficient geographic insurance units (GIUS), as basis in the design of weather index-based crop insurance (WIBI) for rainfed rice in selected provinces in the Philippines, namely: Isabela, Iloilo and Bukidnon. The study aimed to characterize the said locations based on weather patterns, and crop risk profiles in terms of probability of crop failure in order to determine which areas will be subjected to similar index insurance designs, and which farms will be considered with a different one. Initial GIU

designs were established based on political boundaries (municipal, district, or provincial boundaries) for operational considerations. Optimal GIU designs for each province considered were then identified using the two criteria: (1)area-specific weather distribution through mean monthly rainfall patterns; and (2)crop risk profiles based on the probability of crop failure due to rainfall deficit. Analyses were based on forty-one years of synthetically generated, and validated rainfall data from 2010 to 2050. In order to define the optimal GIUs for each province, comparison of the two sets of results were done based on their data requirements and practical efficiency of implementation in the field. For Isabela province, a total of twelve GIUs were defined. In the case of Iloilo, seven GIUs were defined. While for Bukidnon, five GIUs were developed. Results of the study are intended to be used to minimize risk, and thus, reduce the premium for the insurance product. By defining GIUs for WIBI, the insurance products will have high potential in effectively helping farmers cope with and eventually manage climate risks.

ORYZA SATIVA; RAINFED FARMING; RISK; RAIN; CROP INSURANCE

Establishing an aerial mapping service for rice monitoring. **Caballong, N.L. nl.caballong@philrice.gov.ph., Alday, P.A.A., Barroga, R.F. Philippi ne Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines).** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 172-173. 2019.*

Nowadays, hobbyists and photographers have been acquiring ready-to-fly unmanned aerial vehicles (UAVs) for photography and videography. Meanwhile, these same devices can also be used to assess actual rice crop conditions, monitor crop growth, and estimate damaged areas through aerial maps. They just need to be associated with remote sensing and photogrammetry technology. This paper presents the tools and procedures that can be learned by farm service providers, photographers, agriculturists, researchers, and startups in establishing a UAV-based aerial-mapping service for rice farmers, and farming communities. These include UAV aircraft with RGB camera, mission planning app, orthomosaic and map repository software, and geographical information system (GIS) software. First, they will have to choose the UAV that they will be using. There are plenty of commercially available ready-to-fly aircrafts with built-in high definition cameras that they can select from. Then, they will have to pick an autonomous flying and mission control application. This app will allow the UAV to fly on a certain pattern while capturing images of the ground. After that, the orthomosaic software will stitch the captured photos to create a one big aerial map. In the same interface, users can view maps, overlay with polygons, and make measurements. Lastly, using the GIS software, users can post-process the maps to generate vegetation indices (VI) for more precise analysis of the rice canopy. Some of the

Vis that can be calculated include VARI, NGRDI, TGI, and ExG among others. Learning these technologies is one thing but interpreting the generated outputs is another. They must have a good background in rice agriculture in order to provide a holistic service to their target clients, the rice farmers.

ORYZA SATIVA; RICE; MONITORING; CARTOGRAPHY; REMOTE SENSING; IMAGERY; PHOTOGRAPHY

Geospatial mapping of the biodiversity and vegetation communities of Riparian plant species at the Binahaan River [Pastrana, Leyte, Philippines]. **Belax, D.A., Catenza, K.V.Q., Cabelin, K.J.C. Philippine Science High School-Eastern Visayas Campus, Pawing, Palo, Leyte (Philippines). Center for Research in Science and Technology.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 175. 2019.*

Riparian vegetation includes plant communities situated in streams, on river banks, and in floodplains; it is an indicator of a river's health. Disturbance affects riparian vegetation by altering the abundance and diversity of plant organisms. In this study, the diversity of riparian plant species of the Binahaan River in Pastrana, Leyte [Philippines] was assessed to show the status of the riparian area along one of the Leyte Metropolitan Water District's (LMWD) main water sources. To assess the diversity of riparian plant species, the transect method was used. A 5x5 m plot was established in every 200 m interval of transect. All plant organisms in the 5x5 m plot were recorded. After one 1 fieldwork, data on 4 sampling points along the river, with varying levels of disturbance, were collected. 31 genera were recorded, from which 28 have been identified. All genera were identified through morphological identification. The Shannon-Wiener Index shows values ranging from 1.431 to 2.255, with the highest observed in Point 3, followed by Point 1, then Point 2, and lowest in Point 4. Simpson's Diversity Index shows values ranging from 0.6808 to 0.8845 with the highest observed in Point 3, followed by Point 1, then Point 4, and lowest in Point 2, suggesting that Point 3 is the most diverse sampling point as it has the highest diversity level shown by both indices. Moreover, there are no endangered or vulnerable plant species observed in the study site. Overall, the results show a low to medium diversity of riparian plant species in the study area.

RIPARIAN VEGETATION; BIODIVERSITY; SPECIES; CARTOGRAPHY; SURVEYS; RIVERS; PHILIPPINES

GIS [Geographic Information Systems] development of flash flood guidance with selection of reforestation and conservation areas for Bigaan River Basin, Cagayan de Oro City, Philippines. **Vallente, J.R. Jr., jvallente@xu.edu.ph., Abuzo, A.A. Xavier Univ.-Ateneo de Cagayan, Cagayan de Oro, Misamis Oriental (Philippines). Disaster Risk Environment and Management Civil Engineering Dept.** *Sylvatrop (Philippines). The Technical Journal of Philippine Ecosystems and National Resources. 0115-0022. v. 29(2) p. 55-73. 2019.*
https://erdb.denr.gov.ph/2020/05/01/sylvatrop-volume-29-no-2-july-to-december-2019/

Flash floods occur due to varying meteorological and hydrological conditions of the river basin, and changes in climate and land use. These variables make forecasting and detecting flash floods challenging, especially since ares with land use and land cover (LULC) characteristics and vulnerable to heavy flash flood. In Cagayan de Oro, recent calamities brought by extreme rain events affected 2 barangays [villages] Cugman and Gusa -within the Bigaan River Basin. This research aimed to investigate the Flash Flood Guidance system as an early flood warning mechanism, and suggested areas for reforestation and conservation through GIS [Geographic Information System] mapping and land use characteristics. Techniques in geospatial technology, such as remote sensing and geographic information system, were widely used. With field validation, these technologies analyzed the LULC characteristics of the area. Satellite imagery from 2015 obtained through the latest Landsat satellite mission were used to classify the different LULC of the basin. Results determined the flash flood guidance system for the river basin and the areas which needed reforestation and conservation.

WATERSHEDS; FLOODING; LAND USE; REFORESTATION; GEOGRAPHICAL INFORMATION SYSTEMS; IMAGERY; REMOTE SENSING; PHILIPPINES

Mapping risk of landslide at A Luoi District, Thua Thien Hue Province, Vietnam by GIS-based multi-criteria evaluation. **Linh, N.H.K. Hue Univ., Hue City (Vietnam). nguyenhoangkhanlinh@huaf.edu.ph., Degener, J. Goettingen Univ., Goettingen (Germany). jan.degener@geo.uni-goettingen.de., Ngoc, N.B. nguyenbichngoc@huaf.edu.vn., Chau, T.T.M. Hue Univ., Hue City (Vietnam). tranthiminhchau@huaf.edu.vn.** *Asian Journal of Agriculture and Development (Philippines). 1656-4383; 2599-3879. v. 15 (1) p. 87-105. 2018.*
https://ajad.searca.org/article?p=746

The study was conducted to determine the weight of factors influencing landslides through the algorithm Analytical Hierarchy Process (AHP). These factors were used as inputs for establishing a landslide susceptibility map based on the geographic information technologies (GIS) at A Luoi District, Thua Thien Hue province. Results of the study showed that landslide risk could be divided into five levels: very low risk of landslide covered

17,638.22 ha (14%), low risk areas accounted for 41,036.20 ha (34%), medium risk of landslide covered an area of 22,380.84 ha (18%), high risk area was 27,176.99 ha (22.19%), and very high risk area was about 14,231 ha (12%). The results of this study could be used to support the implementation of land use planning, which could help reduce adverse impact of landslides on people and property.

LAND USE; CARTOGRAPHY; LAND SUITABILITY; LANDSLIDES; GEOGRAPHICAL INFORMATION SYSTEMS; VIET NAM

Multiple criteria evaluation of National Cooperative Testing (NCT) sites for rice in the Philippine through GIS [Geographical Information System]-aided optimization technique. **Dela Cruz, A.E. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Lansigan, F.P. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics.** 25. Federation of Crop Science Societies of the Philippines/1. Federation of Plant Science Associations of the Philippines Scientific Conference. Apo View Hotel, Davao, City (Philippine). 16-21 Sep 2019. *Philippine Journal of Crop Science (Philippines). 0115-463X. v. 44 (Supplement no. 1) p. 5. 2019.*

The national cooperative testing (NCT) sites for rice production spread across the country have crucial role and contribution to the overall national agricultural development. However, the sites are not at their most efficient and effective locations, and hence require optimization. Through a systems analysis approach, this study analyzed the geographic positions of existing and proposed rice testing sites relative to primary production zones using a set of criteria namely: (1) proximity to agroclimatic zones or ACZ, (2) proximity to research facilities, (3) yield and (4) exposure to hazards. An indicator-based multi-criteria analysis was applied using the geographic information system (GIS) to evaluate the location-based suitability of current NCT sites, as well as to determine optimum locations for new NCT sites' establishment. Study results reveal which NCT sites are optimally located as follow twelve out of 22 sites are within favorable agro-climatic zones, five sites (5/22) are within the 25-kilometer proximity distance to nearest research center, seven sites (7/22) are not exposed to hazards; and nineteen sites (19/22) are in areas with yield of 4 tons/ha. At an equal-weight scenario (25-25-25-25), where each of the four indicators were assigned 25% weight, half of test sites (11/22) are optimally located. However, at customized-weight scenario (30-30-30-10), where yield, agro-climatic zones, and hazards were given 30% weight each, less than half NCT2 (8/22) are optimally located. Moreover, results show that four out of thirteen agro-climatic zones do not have testing sites; and that the findings of the study are suggestive that at least 59 NCT sites should be established to cover all agro-climatic zones at one site per 500,000 hectares. This study determined which NCT sites are optimally sited using only four criteria. Refining this study by inclusion of more indicators is highly recommended but may be limited by data availability.

ORYZA SATIVA; PLANT PRODUCTION; SITE FACTORS; GEOGRAPHICAL INFORMATION SYSTEMS; EVALUATION