SOUVENIR PROGRAM

and

ABSTRACTS OF PRESENTATIONS

Vision:

Advanced science and technology for prosperous rice-farming communities toward sufficient and affordable rice for all

Mission:

To improve the productivity, profitability, and well-being of rice-farming communities toward a resilient and sustainable industry and nutrition-secure Filipinos through climate-smart, socially inclusive, demand-driven, and partnership-based rice research for development and extension

Core Values and Attributes:

Responsiveness, **R**esilience, and **R**elevance
Integrity, **I**nnovativeness, and **I**nclusivity
Collective Spirit, **C**lient-centricity, and **C**onvergence
Excellence, **E**quity, and **E**mpathy

Integrated Management System (IMS) Policy Statement:

"DA-PhilRice adheres to a system of quality management, environmental protection, and occupational health and safety in its operations to advance rice research for development and extension."

#DA-PhilRiceIMS

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RATIONALE AND OBJECTIVES

The DA-PhilRice charter, Executive Order No. 1061 (November 1985), mandates the Institute to develop and implement a national rice research for development and extension (R4DE) program aimed at improving and sustaining rice production in the Philippines. Along with the Department of Agriculture (DA) and other stakeholders such as state colleges and universities, local government units, private sector, non-governmental organizations, and farmer groups, the DA-PhilRice has successfully implemented, albeit with several challenges, its Strategic Plan 2017-2022. This success has laid the foundation for the implementation of a new strategic plan for 2023-2028, which envisions advanced science and technology for prosperous rice communities, and aims to improve the productivity, profitability, and well-being of rice communities.

The **35th *Ugnay Palay* National Rice R4D Conference**, organized by the DA-PhilRice, serves as a platform to recognize and appreciate the rice R4DE accomplishments and implementation strategies of the various sectors in the rice industry. The conference aims to facilitate interaction among rice R4DE workers and serve as a venue for thought-provoking discourses. It likewise gathers feedback and advice from rice industry stakeholders on the relevant rice R4DE thrusts and initiatives to achieve rice sufficiency, particularly on competitiveness, sustainability, and resiliency in rice and rice-based farming systems. It also seeks to identify appropriate and efficient strategies and areas of collaboration for the development and promotion of rice and rice-based technologies.

The theme for this year's conference, "***Better Rice Communities***", aligns with the new strategic plan for 2023-2028. The plan emphasizes the use of advanced science and technology to create prosperous rice communities and focuses on improving their productivity, profitability, and well-being. The focus on farmers' well-being is deliberate, as they are key to keeping vibrant and happy rice communities.

Overall, the conference aims to facilitate knowledge-sharing, collaboration, and the showcasing of advancements in the rice industry. Its ultimate goal is to help improve the lives of our rice communities by fostering innovation, sustainability, and the adoption of modern technologies.

ABOUT THE GUEST OF HONOR AND KEYNOTE SPEAKER

Francisco Tiu Laurel, Jr., the newly appointed Secretary of Agriculture, was the former President of Frabelle Group of Companies. The conglomerate traces its roots from a deep-sea fishing firm established in 1966.

"Kiko" to his friends and colleagues, Francisco Jr. is a hands-on executive. He learned the ropes of his family's fishing business at the age of 19 and used a multidisciplinary approach to build his company.

While at the helm of Frabelle Group, Francisco Jr. likes to keep things simple. He sets bold objectives that are also attainable and relevant – traits that could help him well in his new role as agriculture secretary.

Since accepting the offer of President Ferdinand Marcos, Jr. to succeed him as DA Secretary, Sec. Kiko divested from his family's businesses. Asked why he took the challenge, he said he wanted to give back to Philippine agriculture. His current motto: "Bayan naman."

Currently, Sec. Kiko is a Captain and Commander in the Naval Affiliated Reserve Force NCR (WESPHIL) of the Philippine Navy.

OVERVIEW OF ACTIVITIES

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Opening Program
• Opening Message
• Keynote Message
• Turnover of BPI Foundation Grant for the RiceBIS Community in Negros Occidental
• Opening/viewing of posters, exhibits, and technology pitching
• Launching of new knowledge products
• MASAGANA Rice Industry Development Program overview</td><td rowspan="3">Facility tour (7-9AM)
Viewing of posters and exhibits, and Technology Pitching</td><td>Viewing of posters and exhibits, Technology Pitching</td></tr>
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• Synthesis
• Awarding of best posters
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<tr><td>3:00 – 3:30</td><td colspan="2">Coffee break + viewing of posters and exhibits</td></tr>
<tr><td>3:30 – 6:00</td><td>Concurrent Sessions 1 & 2</td><td>Concurrent Sessions 3 & 4</td></tr>
<tr><td>6:00 – 9:00</td><td>Dinner</td><td>Fellowship and Dinner</td></tr>
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Venues:

Opening and closing programs, and plenary sessions	*DA-CBC Plenary Hall*
Concurrent sessions	*DA-CBC Plenary Hall, Social Hall*
Poster area	*Bamboo Garden*
Exhibits / Technology Pitching Area	*DA-CBC Parking Area*
Breakfast / Lunch / Dinner	*DA-CBC Multi-purpose Hall*
Fellowship	*Roof Scape 2 @ PhilRice Hostel*

SCHEDULE OF ACTIVITIES

Day 1: 29 November 2023 (Wednesday)		DA-CBC PLENARY HALL
7:00 – 8:30 AM	Registration of Participants	Registration Committee
	Ugnay Palay Mobile App instructional video	
8:30	**OPENING PROGRAM**	**Ms. Leylani M. Juliano** *Master of Ceremonies*
	▪ Invocation	**Mr. Mighty Jemuel C. Sotto** *Information Systems Researcher III*
	▪ National Anthem	**Mr. Jonathan U. Cabral** *Science Research Specialist II*
	▪ Welcome/Opening Message and Introduction of the Guest of Honor and Keynote Speaker	**Dr. John C. de Leon** *Executive Director, DA-PhilRice*
	▪ Message of the Guest of Honor and Keynote Speaker	**Secretary Francisco Tiu Laurel Jr.** *Department of Agriculture (DA)*
	▪ Turnover of BPI Foundation Grant for the RiceBIS Community in Negros Occidental	Guest of Honor and Keynote Speaker (*to be assisted by DA-PhilRice Trustees and Officials*)
	▪ Opening and Viewing of Posters and Exhibits, and Technology pitching	
	▪ Health break	
10:30	▪ Launching of new DA-PhilRice knowledge products	*c/o DevCom*
	▪ MASAGANA Rice Industry Development Program	**Undersecretary Leocadio S. Sebastian** *Rice Industry Development, DA*

Documenters: Recille G. Aquino and Melissa Grace Joy R. Angoluan
Rapporteurs: Gabriel A. Mariano, Aldrin G. Castro, Jennylyn Arang, Patricia Jean B. Duldulao
Photo / Video: Carlo G. Dacumos, Jasper A. Manlusoc, Christopher John C. Gonzales, Mark Daniel T. Narca, and John Paul C. Valdez

NEW RICE KNOWLEDGE PRODUCTS

12:00NN	*LUNCH BREAK*	*DA-CBC Multi-purpose Hall*
1:00 – 3:30 PM	**PLENARY SESSIONS**	*DA-CBC Plenary Hall*
1:00 – 2:00	**PLENARY PANEL SESSION 1: MATATAG** *Moderator:* Dr. Jasper G. Tallada *Lead Discussant*: **Dr. John C. de Leon**, *DA-PhilRice* *Discussants*: **Dr. Gella Patria L. Abella**, *CLSU-ICCEM* **Dr. Sankalp Bhosale**, *IRRI* **Dr. Ria Liza C. Canlas**, *National University* **Dr. Eufemio T. Rasco Jr.**, *NAST* **Dr. V. Bruce J. Tolentino**, *Bangko Sentral ng Pilipinas* *Documenters:* Amherstia Llou L.Rosas and Joselito R. Mamaril Jr. *Rapporteurs:* Gabriel A. Mariano, Aldrin G. Castro, Jennylyn Arang, and Patricia Jean B. Duldulao *Photo/Video:* Carlo G. Dacumos, Jasper A. Manlusoc, Christopher John C. Gonzales, Mark Daniel T. Narca, and John Paul C. Valdez	
2:00 – 3:00	**PLENARY PANEL SESSION 2: SAMA-SAMA** *Moderator:* Dr. Ofelia C. Malonzo *Lead Discussant*: **Dr. Karen Eloisa T. Barroga**, *DA-PhilRice* *Discussants*: **Dr. William D. Dar**, *Go Negosyo* **Dr. Maria Julia Golloso-Gubat,** *DOST-FNRI* **Mr. Shandy M. Hubilla,** *DA-F2C2* **Mr. Eduardo N. Reyes Jr.**, *Land Bank of the Philippines* **Ms. Rowena D.R. Sadicon**, *PRISM* *Documenters:* John Brian A. Cali and Melissa Grace Joy R. Angoluan *Rapporteurs:* Gabriel A. Mariano, Aldrin G. Castro, Jennylyn Arang, and Patricia Jean B. Duldulao *Photo/Video:* Carlo G. Dacumos, Jasper A. Manlusoc, Christopher John C. Gonzales, Mark Daniel T. Narca, and John Paul C. Valdez	
3:00 – 3:30	*Coffee Break + Viewing of Posters and Exhibits*	*DA-CBC Multi-Purpose Hall / Bamboo Garden*
3:30 – 6:00	Concurrent Session 1	*DA-CBC Plenary Hall*
	Concurrent Session 2	*Social Hall*
6:00 – 9:00	*DINNER*	*DA-CBC Multi-purpose Hall*

CONCURRENT SESSION 1 (Nov 29)		**DA-CBC PLENARY HALL**
Climate change adaptation *Chair/Moderator:* Dr. Ricardo F. Orge		
3:30 – 3:50 PM	Mitigating initiatives for climate change-vulnerable rice-farming communities under Rice SUSTAIN (Sustainable Technologies and Appropriate Information Needs) Project for increased productivity in Bicol and Eastern Visayas Regions	Loven Babes O. Rafallo *DA-PhilRice Bicol*

3:50 – 4:10	Profiling farmer-grown rice genotypes in the Philippines	Roseleen M. Capiroso *DA-PhilRice CES*
4:10 – 4:30	Emerging outcomes of the Philippine RCEF Seed Program in its mid-term implementation	Thich Eloise Paris *DA-PhilRice CES*
4:30 – 4:50	Search for climate-resilient rice varieties with multiple adaptation to irrigated and adverse rice systems	Christopher C. Cabusora *DA-PhilRice CES*
4:50 – 5:10	Fertile lands: Performance of fertilizers in rice production	Wilfredo B. Collado *DA-PhilRice Mindoro*
5:10 – 5:30	Adapting to water scarcity: Enhancing water productivity in aerobic rice cultivation through drip irrigation	Kristine S. Pascual *DA-PhilRice CES*
5:30 – 5:50	The pursuit on ecology and management of *Cyperus rotundus* L. infesting rice under flooded conditions	Dindo King M. Donayre *DA-PhilRice CES*
5:50 – 6:10	Identification of combined tungro virus and blast-resistant Philippine traditional rice varieties using KASP SNP markers	Daphnie D. Abonitalla *DA-PhilRice Los Baños*

Documenter: Roldan G. Antonio and Amherstia Llou L. Rosas
Rapporteur: Gabriel A. Mariano, Recille G. Aquino, and Melissa Grace Joy R. Angoluan
Photo/Video: Carlo G. Dacumos, Jasper A. Manlusoc, Christopher John C. Gonzales, Mark Daniel T. Narca, and John Paul C. Valdez

CONCURRENT SESSION 2 (Nov 29)	**SOCIAL HALL**
Farm-clustering and consolidation *Chair/Moderator:* Dr. Diadem G. Esmero	
3:30 – 3:50 PM	Development of RiceBIS community in Masbate through clustering approach	Elenor C. Sadang *DA-PhilRice Bicol*
3:50 – 4:10	Roll-over scheme: Building capital for a working farmers' association	Richelle G. Villanueva *DA-PhilRice Isabela*
4:10 – 4:30	Transforming rice-based farms into farm enterprises: A community-based development project in Ilocos Norte	Vanessa Joy B. Marquez *DA-RFO I*
4:30 – 4:50	Effects of redrying methods on the milling potential, crude protein and total phenolic contents, antioxidant activity of stored inorganic and organically-grown paddy	Mary Ann U. Baradi *DA-PhilRice Batac*
4:50 – 5:10	Malusog Rice integration in the Masagana Rice Industry Development Program: A catalyst for food and nutrition-security in Regions 5 and 8	Azryl May M. Jimenez *DA-PhilRice Bicol*
5:10 – 5:30	Brown rice market segmentation: The case of Metro Manila	Rhemilyn R. Sevilla *DA-PhilRice Los Baños*
5:30 – 5:50	Increasing crop productivity and income in rice-based water-scarce environments using a mechanized dry-seeding technology	Elmer G. Bautista *DA-PhilRice CES*
5:50 – 6:10	Optimizing hybrid rice seed yield and income in AxR seed production of PSB Rc72H through mechanized transplanting	Zarah Faith L. Lunag *DA-PhilRice Isabela*

Documenter: Christine Angel D. Damaso and John Brian A. Cali

Rapporteur: Aldrin G. Castro, Jennylyn Arang, and Bobby B. Lacsina
Photo/Video: Carlo G. Dacumos, Jasper A. Manlusoc, Christopher John C. Gonzales, Mark Daniel T. Narca, and John Paul C. Valdez

Day 2: 30 November 2023 (Thursday)		**DA-CBC PLENARY HALL**
7:00 – 10:30 AM	Tour of DA-PhilRice Experimental Farms and Facilities	Field Tour Committee
	Viewing of posters and exhibits	*Bamboo Garden / DA-CBC Parking Area*
	Technology Pitching	*DA-CBC Parking Area*
10:30 – 11:00	Recap of Day 1	
11:00 – 12:00	**PLENARY PANEL SESSION 3: GANADO** *Moderator:* Dr. Jaime A. Manalo IV *Lead Discussant*: **Dr. Aurora M. Corales**, *DA-PhilRice* *Discussants*: **Dr. Fermin D. Adriano**, *Consultant* **Ms. Cheryl Marie N. Caballero**, *DA-PhilRice Technical Consultant* **Dr. Rex L. Navarro**, *DA-PhilRice Technical Consultant* *Documenter:* Amherstia Llou L. Rosas and Joselito R. Mamaril Jr. *Rapporteur:* Gabriel A. Mariano, Marry Joy M. Calpito, Jennylyn Arang, and Patricia Jean B. Duldulao *Photo/Video:* Joshua P. Mendoza, Ardian M. Dolera, Aldrin G. Castro, Jimson B. Bedonia, and Ravyin Fredric P. Esteban	
12:00 NN	*LUNCH BREAK*	*DA-CBC Multi-purpose Hall*
1:00 – 2:10 PM	**PLENARY PANEL SESSION 4: NAPAPANAHON** *Moderator:* Dr. Ronan G. Zagado *Lead Discussant*: **Dr. Eduardo Jimmy P. Quilang**, *DA-PhilRice* *Discussants*: **Dr. Anthony James C. Bautista**, *UST RCNAS* **Mr. Dindo King M. Donayre**, *DA-PhilRice* **Dr. Jonathan V. Fabula**, *CLSU PreDiCt* **Dr. Luis Rey I. Velasco**, *DA-PhilRice Trustee* *Documenter:* John Brian A. Cali and Melissa Grace Joy R. Angoluan *Rapporteur:* Gabriel A. Mariano, Marry Joy M. Calpito, Jennylyn Arang, and Patricia Jean B. Duldulao *Photo/Video:* Joshua P. Mendoza, Ardian M. Dolera, Aldrin G. Castro, Jimson B. Bedonia, and Ravyin Fredric P. Esteban	
2:10 – 5:30	Concurrent Session 3	*Social Hall*
	Concurrent Session 4	*DA-CBC Plenary Hall*
3:10 – 3:30	*Coffee Break + Viewing of Posters and Exhibits*	*DA-CBC Multi-purpose Hall / Bamboo Garden*
6:00	*Dinner / Fellowship*	*DA-CBC Multi-purpose Hall / Roofscape 2 @ PhilRice Hostel*

CONCURRENT SESSION 3 (Nov 30)		SOCIAL HALL
Farmer-entrepreneurs in the Rice Value Chain *Chair/Moderator:* Ms. Alice B. Mataia		
2:10 – 2:30 PM	2022 costs and returns of palay production in the Philippines	Manuela S. Nalugon *Philippine Statistics Authority*
2:30 – 2:50	Understanding current issues in the Philippine rice sector: Policy options to protect farmers' and consumers' welfare	Aerone Philippe G. Bautista *DA-PhilRice CES*
2:50 – 3:10	Clustering approach toward agroenterprise development: The RiceBIS 1.0 experience in Regions 2 and CAR	Richzen G. Magno *DA-PhilRice Isabela*
3:10 – 3:30	*Coffee Break*	
3:30 – 3:50	Empowering farmers through agripreneurship: The case of Batitang Agriculture Cooperative in RiceBIS Zaragoza, Nueva Ecija	Shantel Anne Nicole E. Chavez *DA-PhilRice CES*
3:50 – 4:10	Rice value chain analysis in Western Visayas: Structure, value addition, constraints, and strategies	Flerida A. Demamay *DA-Western Visayas*
4:10 – 4:30	To what extent is the NSIC Rc160 a success story?	Louie Gerard F. Orcullo *DA-PhilRice CES*

Documenter: Joybeth N. Lisondra and John Brian A. Cali
Rapporteur: Marry Joy M. Calpito, Jennylyn Arang, and Bobby B. Lacsina
Photo/Video: Joshua P. Mendoza, Ardian M. Dolera, Aldrin G. Castro, Jimson B. Bedonia, and Ravyin Fredric P. Esteban

CONCURRENT SESSION 4 (Nov 30)		DA-CBC PLENARY HALL
Digital Transformation *Chair/Moderator:* Mr. Dindo King M. Donayre		
2:10 – 2:30 PM	RiceLytics: Enabling data-driven decision-making in the rice sector	Ranxel M. Almario *DA-PhilRice CES*
2:30 – 2:50	PalayCheck App: An integrated rice farm management smartphone application tool	Mighty Jemuel C. Sotto *DA-PhilRice CES*
2:50 – 3:10	D4AgPH: Bridging gaps and unlocking opportunities	Arnel Rala *IRRI*
3:10 – 3:30	*Coffee Break*	
3:30 – 3:50	Outscaling of soil fertility mapping and map utilization on irrigated rice areas of Allacapan, Cagayan (Region 2), Philippines	Donna Aura G. Calibuyut *DA-RFO 2*
3:50 – 4:10	Influence of Rice Crop Manager (RCM) recommendations on yield of rice in saline and zinc-deficient areas of Region 2	Ferdinand B. Enriquez *DA-RFO 2*
4:10 – 4:30	Enhancing rice yield in the diverse rice-growing areas of Region 6 using the Rice Crop Manager (RCM)	Luisa P. Fulgueras *DA-RFO 6*

4:30 – 4:50	Pest Risk Identification and Management (PRIME) – Digitalization of the rice pest surveillance system in the Philippines	Ulysses G. Duque *Bureau of Plant Industry*
4:50 – 5:10	Profiling of pest and diseases incidence in irrigated rice areas: The PRIME data analysis	Leonardo V. Marquez *DA-PhilRice CES*

Documenter: Rizzla S. Ona and Amherstia Llou L. Rosas
Rapporteur: Gabriel A. Mariano, Recille G. Aquino, and Melissa Grace Joy R. Angoluan
Photo/Video: Joshua P. Mendoza, Ardian M. Dolera, Aldrin G. Castro, Jimson B. Bedonia, and Ravyin Fredric P. Esteban

Day 3: 1 December 2023 (Friday)		**DA-CBC PLENARY HALL**
7:00 – 9:00 AM	Viewing of posters and exhibits	*Bamboo Garden / DA-CBC Parking Area*
	Technology Pitching	*DA-CBC Parking Area*
9:00 – 9:30	Recap of Days 1&2	
9:30 – 10:30	**PLENARY PANEL SESSION 5: FARMERS' BEST PRACTICES AND EXPERIENCES** *Moderator:* Dr. Marissa V. Romero *Lead Discussant*: **Mr. U-Nichols A. Manalo**, *DA-FOS* *Discussants*: **Mr. Leo Franco L. Ebardo**, *Farmer-Agripreneur* **Ms. Frianina V. Resplandor**, *Myriad Farms* **Mr. Jhimcelle V. Salvador**, *DA-ATI RTC II* **Ms. Hazel A. Tanchuling**, *R1* **Engr. Romeo S. Vasquez**, *DA-PhilRice Trustee* *Documenter:* Rizzla S. Ona and Amherstia Llou L. Rosas *Rapporteur:* Gabriel A. Mariano, John Brian A. Cali, Jennylyn Arang, and Patricia Jean B. Duldulao *Photo/Video:* Jose Mari Z. Nombrere, Ryan L. Bermoza, Billy D. Flores, William James S. Viernes, and Aeron John C. Garcia	
10:30 – 12:00	**CLOSING PROGRAM** *Master of Ceremonies:* Dr. Marissa V. Romero	
	▪ Synthesis	**Dr. Flordeliza H. Bordey** *DED for Special Concerns / RCEF-PMO Director, DA-PhilRice*
	▪ Awarding of Best Posters	
	▪ Vote of thanks	**Dr. John C. de Leon** *Executive Director, DA-PhilRice*
12:00NN	*LUNCH*	*DA-CBC Multi-purpose Hall*
1:00PM	*Departure of participants*	

PROFILES OF PLENARY PANEL DISCUSSANTS AND ABSTRACTS OF PAPER PRESENTATIONS

MASAGANA RICE INDUSTRY DEVELOPMENT PROGRAM

UNDERSECRETARY LEOCADIO S. SEBASTIAN
Rice Industry Development, DA

Rice, more than a staple crop, is a political force in the Philippines.

The staple contributes significantly to the agricultural sector, comprising 23% of the gross value at approximately ₱404 billion. Despite a record-high production volume of 19.76 million metric tons in 2022, challenges persist, impacting both supply and demand.

Low productivity and competitiveness, an underdeveloped supply chain, insufficient R&D investment, and low application of modern farming technologies, along with a weak research and extension system hound the industry. Meanwhile, the demand for rice continues to rise across income groups. The net per capita rice available for food (an approximation of per capita rice consumption) also rose from 108 kg per person per year in 2016 to 130 kg per person per year in 2021.

President Ferdinand Marcos Jr., in his 2022 State of the Nation Address, highlighted the need for a long-term solution. This vision hinges on strengthening the rice value chain, encompassing all stakeholders from farmers to consumers.

Research entitled *"Sources of Rice Production Growth: Delphi Expert and Farm Household Survey Findings"* written by Dr. Harold Glenn A. Valera (2022) revealed that the main contributory factor to the growth in rice production is R&D (38%). This is followed by infrastructure provision (32%), extension services (16%), and environmental factors (14%). This serves as a veritable guide for government investment decisions if the goal is achieving sustainable and higher productivity.

The MRIDP aims to attain at least 90% rice sufficiency level in 2023 and reaching as high as 97.5% by 2028 to meet the increasing rice demand. This shall be realized through the systematic and organized implementation of good agricultural and agribusiness practices, innovations, and science and technology across the rice-based value chain.

Anchored on an acrostic of the word "Ma-Sa-Ga-Na", MRIDP's approaches feature four core strategies: **Ma**tatag (resilience to climate change challenges); **Sa**ma-sama (unity and convergence in farm-clustering and consolidation); **Ga**nado (motivated and enthusiastic farmer-entrepreneurs in the rice value chain); and **Na**papanahon (timeliness and relevant focus on digital transformation).

- Matatag emphasizes resilience to climate change challenges. It addresses issues such as suboptimal planting times and declining soil fertility by promoting balanced fertilization and associated technologies, diversification, and alternative income streams.

- Sama-sama centers on farm-clustering and consolidation. The convergence of interventions into clusters ensures wider adoption of good agricultural practices, economies of scale, more efficient delivery of government assistance, and farmers' higher bargaining power.

- Ganado envisions farmers as entrepreneurs in the rice value chain. By linking clusters to the market, the program aims to produce high-quality consumer-preferred rice and spur agroenterprise development.

- Napapanahon focuses on digital transformation. Leveraging technology, such as satellite imagery and drones, provides timely and accurate information for decision-making, ultimately improving program implementation and farm operations.

The MRIDP shall work with both public and private partners for mentoring, value chain modeling, enterprise development, and provision of necessary resources. Considering the unique location-specific needs, province-specific rice industry development plans will also be crafted.

Dr. Leocadio S. Sebastian is the Undersecretary for Rice Industry Development, Department of Agriculture, and a Career Executive Service Officer I (CESO I).

He was Regional Program Leader for CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) Southeast Asia from September 16, 2013, to March 15, 2020. Before joining CCAFS, he was Regional Director for Asia Pacific Region at Bioversity International (September 2008-August 2013), and the second Executive Director of the Philippine Rice Research Institute (PhilRice) from 2000 to 2008.

A multi-awarded plant breeder and research administrator, Dr. Sebastian bagged prestigious awards in the Philippines, such as the Ten Outstanding Young Men (TOYM) in 2001, Outstanding Young Scientist in Plant Breeding in 1999, Pantas (Sage) Award for Research Management, and JICA Presidential Award. He was also one of the 2011 Fr. Jose Burgos Awardee of the Provincial Government of Ilocos Sur. He was also awarded a medal by the Ministry of Agriculture and Rural Development (MARD), with its highest recognition for expatriates making a significant contribution to agriculture and rural development in Vietnam in 2019.

He was appointed by President Rodrigo Duterte as an Assistant Secretary on January 7, 2021, and as Undersecretary on March 4, 2022. Dr. Sebastian holds a career rank in Philippine civil service as Career Service Executive Officer I (CESO I-highest career service rank) conferred in 2003 by President Gloria Macapagal Arroyo and as a Career Executive Officer I (CEO I) in 2007 by the Civil Service Commission.

Dr. Sebastian has a Ph.D. in Plant Breeding and Genetics from Cornell University, and he obtained his BS and MS degrees from the UP Los Baños.

PLENARY PANEL SESSION 1. *MATATAG*

The session features current government plans and strategies to alleviate the impacts of climate change on rice cultivation, and improve resiliency and stability by motivating farmers to optimize yield, mitigate risks, and reduce losses.

MATATAG: Resilience and Stability in Climate Change Adaptation

Dr. JOHN C. DE LEON
Executive Director, DA-PhilRice

This core strategy focuses on the imperative need to bolster the resilience and stability of agricultural practices in the face of escalating climate change impacts. The primary objective is to empower farmers to optimize yield, mitigate risks, minimize losses, and fortify their adaptability to dynamic environmental conditions.

It encompasses strategic interventions tailored to specific seasonal challenges. Firstly, adjustments in planting calendars during the wet season are recommended to preempt risks associated with typhoon impacts. Ensuring a steady supply of irrigation water and incorporating hybrid and early-maturing inbred rice varieties are among the adjustments.

Secondly, it advocates for a shift in main production toward the dry season, targeting 1.5 million hectares with robust irrigation infrastructure. This approach emphasizes the optimization of planting dates (December to January), utilization of high-yielding varieties, and the practice of integrated crop management techniques such as balanced fertilization and the PalayCheck System. Additionally, a comprehensive support package, encompassing subsidies, credit/ financing options, crop insurance, technical assistance, farm-clustering, and marketing support, is proposed to further hasten the transition.

Furthermore, it underscores the importance of promoting and supporting crop diversification and the integration of crop-livestock-fisheries practices, particularly where economically viable and ecologically appropriate. The ultimate goal is to intensify rice and other food production schemes in a manner that pursues agroecological intensification, thereby fostering sustainable agricultural practices resilient to the impacts of climate change.

To sum it up, MATATAG aims to not only enhance the adaptive capacity of farmers but also contribute to the broader goals of agricultural sustainability and food security in the face of an increasingly uncertain climate-dependent future.

Dr. John C. de Leon has led national and international rice breeding programs prior to being appointed as DA-PhilRice Executive Director in December 2019.

He earned his academic degrees from UP Los Baños (BS 1990, MS 1994), and the United Graduate School of Agricultural Sciences, Iwate University (PhD 2001). He was inducted to the Gamma Sigma Delta Honor Society of Agriculture, UP Chapter, in 2004; awarded UPLB 2022 Distinguished Alumnus of the College of Agriculture and Food Science; Order of Saint Gabriel the Archangel for Outstanding Achievement by an Alumnus, Holy Angel University (2023); and Digirati Distinction Award (team), Asian Institute of Digital Transformation (2023).

Under his leadership and guidance on groundbreaking innovations (new varieties developed, use of drones for smart farming, ICT-based tools and applications, farm mechanization, PRIME and pest management technologies, PRISM, etc.), DA-PhilRice knowledge-sharing and collaborations were facilitated. Strengthening our communication strategies through social media and other platforms, and sustaining partnerships with the private sector, the Institute has brought unprecedented benefits to farmers and in the rice industry.

Under his stewardship, DA-PhilRice has garnered national and international awards, such as Asia's Best Employer Brand, GAD International Best Practice, Outstanding GAD-Responsive Agency, and many more. These awards are a testament to his devotion to staff welfare and sustaining a healthy workplace for all.

Empathy, compassion, and genuine concern for others are core values deeply embedded in Dr. de Leon's leadership philosophy. What sets him apart is his unwavering commitment to ensuring that the well-being of his people remains the central focus.

PLENARY PANEL SPEAKERS / DISCUSSANTS

Dr. Gella Patria L. Abella, Associate Professor V, currently heads the Institute for Climate Change and Environmental Management (ICCEM), College of Science, Central Luzon State University. She finished BS Human Ecology major in Human Settlements Planning (1997), MS (2003) and PhD (2017) in Environmental Science from UPLB. In 2018, she became a licensed Environmental Planner.

She received the Best Paper Award for her research on Systems Approach of Mainstreaming Disaster Risk Reduction in the Comprehensive Land Use Plan of San Jose City, Nueva Ecija during the International Conference in Urban and Regional Planning in March 2018.

She has been involved in several research projects: "Coastal Resource Management, Integrating Coastal Resource Assessment and Valuation, Carrying Capacity, Climate Change Adaptation and Disaster Risk Reduction in the Province of Zambales: A Systems Approach"; "CLSU Land Use Development and Infrastructure Plan 2021-2031"; "Formulation of Nutri-chips for Disaster Resiliency"; "Updating of the Comprehensive Land Use Plan of the City of Laoag for 2020 – 2029"; and "Community-Level SARAI-Enhanced Agricultural Monitoring System (CL SEAMS) and Crop Advisories". Currently, she is the program lead of eFARM (engaging Food and Agriculture Resources Management) Academy and Project SAFE, both funded by the Commission on Higher Education.

Her fields of expertise include land use planning, climate change adaptation action planning, disaster risk assessment, and coastal resource management.

Dr. Ria Liza C. Canlas is a registered civil engineer, accredited Materials Engineer 1, and certified patent agent. She has a BS from the Mapua Institute of Technology, Master of Engineering Management from the Pamantasan ng Lungsod ng Maynila, and Doctor of Technology from the Technological University of the Philippines. She also completed a Graduate Diploma Course on Innovation and Creative Entrepreneurship (ICE) at Thames International.

Dr. Ria is an award-winning scientist-inventor-engineer-academician-patent professional-entrepreneur-science communicator tagged as the Feminine Genius ASEAN Designer and Woman in Science. Her 30 years of experience has paved the way to be considered as one of the country's faces of innovation and brave tech-startup founders.

She was awarded by the Commission on Higher Education (CHED) with a prestigious grant to conduct data-driven research on mapping of emerging industries for Philippine R&D competitiveness in relation to our ASEAN neighbors. Her project led to R&D cooperation among the top universities in ASEAN.

Her inventions made her win national awards. The most recent ones include (1) the Gold and Gran Prix "*Malasakit*" Good Design Award 2019 given by the Design Center Philippines and DTI; Grand Winner of the Alfredo M. Yao Intellectual Property Award 2020 by the IPOPHL and Philippine Chamber of Commerce and Industry (PCCI); 2nd Place for the Regional Invention Contest and Exhibits (RICE) in the National Capital Region under the Likha Award 2021 for Outstanding Government-Funded Creative Research given by the Department of Science and Technology (DOST) and DOST-NCR; and Top 500 Promising Global Technologies by Slingshot Singapore.

She is member of various professional and civic groups to such as: Founder of the Southeast Asia Emerging Industries Consortium; Founder-President of Finite Element Institute of the Philippines (FEIP); Vice President of the Researchers, Inventors, Scientists & Engineers of the Philippines (RISE); National Auditor of Philippine Association of University Women (PAUW). She is member of Association of PAQE (Patent) Professionals (APP); Lifetime Member of Philippine Institute of Civil Engineers (PICE); Member of the American Concrete Institute Philippines (ACIP); International member of the Project Management Institute (PMI); Member of the Filipino Inventors Federation (FILINFED); Member of the Rotary Club Manila Premier (RCMP); and of the Board of Directors of the Mapua CE-ENSE Alumni Association.

She is Director of the Center for Innovation and Entrepreneurship of the National University – Philippines; a Technical Expert of the IP Office of UP Diliman; and an IP Expert of SPRUSON & FERGUSON (ASIA) Pte Ltd. Singapore; and currently an Executive Member representing the Scientific Community of the National Innovation Council.

Dr. Eufemio T. Rasco Jr. has led R&D institutions and projects covering plant breeding, variety evaluation, crop physiology, agronomic studies, and environmental impact studies of farming practices.

His work experiences include leadership positions in UP Los Baños, Institute of Plant Breeding, and UP Mindanao for more than 20 years, the private sector (East West Seed Company) for 8 years, government R and D institute (PhilRice) for 4 years, and the International Potato Institute for 6 years.

His pioneering and notable achievements involved tropical vegetable crops, potato, sweet potato, and underutilized crops such as sago and nipa. Commercial adoption of hybrids he developed for East West was global, fast, and record-breaking in market domination over 30 years in some cases. Altogether his plant breeding work directly benefited millions of farmers and consumers in all continents except Antarctica.

He has published more than 100 journal articles and 6 books as main or co-author. Upon retirement, he focused on studying connections between agriculture, nutrition and the environment.

Some of his awards include: 2009 Outstanding Alumnus (UP System), 2009 Outstanding Senior Faculty from UP Mindanao Foundation Inc., 1990 Pantas Award (DOST-PCARRD), 1990 Rizal Pro Patria Award (DA), 1989 Ten Outstanding Young Men (Philippine Jaycees), and 1989 Ten Outstanding Young Scientists (DOST).

He earned his PhD in Plant Breeding and International Agriculture from Cornell University in 1979; MS in Plant Physiology (1974), and BS in Agriculture major in Animal Science (1971) from UPLB.

Dr. V. Bruce J. Tolentino is currently an Independent Member of the Monetary Board of the Bangko Sentral ng Pilipinas.

He has over 36 years of progressively senior-level experience in development agencies, governments, and NGOs in international development, governance, development finance and banking, analysis, and planning of socioeconomic programming, reform, and research-for-development initiatives, projects, and organizations in Asia, Africa, and Central America. He has extensive hands-on, field experience in top management of international, large-scale, governance/rural/agricultural, and agro-enterprise development programs. His international-level professional consulting experience is on development issues for various governments and policy research and donor agencies.

He served as IRRI Deputy Director-General for Communication and Partnership, and Secretary to the Board of Trustees from March 2012 to June 2018. He was Deputy Minister/ Undersecretary (Planning, Policy, and International Trade) of the DA in 1986-1993, and Founding Executive Director of the Agricultural Credit Policy Council (ACPC) (1987-1990).

He earned his Ph.D. in Economics in 1986 at the University of Hawaii and the East West Center, USA, and a Master's degree in Economics at Xavier University in the Philippines.

PLENARY PANEL SESSION 2. *SAMA-SAMA*

The session delves on various opportunities, benefits, and advantages of farm-clustering and consolidation, like accessing government services. It also centers on nutrition and mechanization.

SAMA-SAMA: Unity and Convergence in Farm-Clustering and Consolidation

Dr. KAREN ELOISA T. BARROGA
DED for Development, DA-PhilRice

This strategy wants to cultivate unity and convergence through the deliberate clustering and consolidation of farms, with the overarching aim of augmenting rice production. The primary objectives entail the establishment of 14,000 hybrid rice clusters yielding 10 metric tons per hectare, and 9,400 inbred clusters yielding 8 t/ha.

Action areas are designed to facilitate this transformation. Firstly, it recommends the conduct of supervised clustering encompassing a minimum of 100 hectares at the barangay and municipal levels. This strategic approach targets key stakeholders including irrigators' associations, existing Farm Clustering Associations (FCAs), Agrarian Reform Beneficiaries (ARBs), and rice-based farmers' and workers' associations supported by the Department of Labor and Employment (DOLE).

Secondly, cluster needs will be aligned with resource provision to enable the transition of clusters into viable agribusiness enterprises. This includes the integration of agri-agra subsidies, covering essential inputs such as seeds, fertilizers, and machinery, along with credit delivery systems facilitated by government financial institutions, encompassing credit and insurance guarantees.

It further advocates for the adoption of rice-based family farming systems, comprising on-farm, off-farm, and non-farm enterprises, as a means to diversify income sources and enhance family livelihoods.

Through its systematic implementation, SAMA-SAMA envisions a paradigm shift in rice production toward a more cohesive and consolidated approach. By fostering unity and convergence, this initiative aims not only to significantly pull up rice yields but also to elevate the socio-economic well-being of farming communities, ultimately contributing to broader goals of agricultural sustainability and food security.

As Deputy Executive Director for Development at DA-PhilRice, **Dr. Karen Eloisa Tanzo-Barroga** helps ensure the efficient and effective execution of the Institute's development interventions. She had led/co-led projects, such as the promotion of hybrid rice, certified inbred seeds, and Golden Rice; the development and promotion of the country's *PalayCheck* System; the institutionalization of knowledge sharing and learning, and other knowledge products and platforms at PhilRice; and the priming of AgRiDOCs, a new breed of extension professionals.

These accomplishments earned her recognitions from DA-PhilRice, an Achievement Award in Extension from the Crop Science Society of the Philippines, and an Outstanding Alumna Award for Agricultural Extension and Communication from UPLB. These also enabled her to serve as chair/member in the Steering Committee of the Irrigated Rice Research Consortium (IRRC) of IRRI and the Swiss Agency for Development and Cooperation; as a resource person on extension/development at the International Food Policy Research Institute; as an external reviewer for IRRC's project on Closing Rice Yield Gaps in Asia; and as President of the Philippine Extension and Advisory Services Network. She now serves as a member of KOPIA-Philippines' Steering Committee and vice-chair of the technical working group of RCEF Extension and its lead at PhilRice.

She has BS and MS degrees in DevComm from UPLB; PhD from the University of Western Australia through ACIAR's John Allwright Fellowship and DA-PhilRice's Staff Development Programs. She also holds a master's degree in Development Management from DAP and has recently completed the Executive Masterclass from the Asian Institute of Digital Transformation.

PLENARY PANEL SPEAKERS / DISCUSSANTS

Dr. William D. Dar's servant leadership, guided by solid and enunciated principles of food security, has earned him laurels such as the "1st MS Swaminathan Global Leadership Award for Sustainable Development 2022" from India, "Lifetime Achievers Award" in 2020, "Lifetime Contributor Award" by the Asia CEO Awards, and "Presidential Award" from the UPLB Alumni Association.

In 2016, Dr. Dar received "The Outstanding Filipino (TOFIL) Award" in cognizance of his servant leadership, which was instrumental in transforming the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) into one of the top-performing centers of the Consultative Group on International Agricultural Research (CGIAR). In his 15 years as Director General of ICRISAT, he championed and institutionalized the Inclusive Market-Oriented Development (IMOD) strategy, in which farmers became active participants.

Prior to his international stint, he was Professor 6 at Benguet State University (BSU) and Vice President for R&D from 1985 to 1987. Dr. Dar was the founding Director of the DA-Bureau of Agricultural Research (DA-BAR) in 1987-1994. He then served as Executive Director of the DOST-Philippine Council for Agriculture, Forestry and Natural Resources R&D (PCARRD) in 1994-1998. During his term as DA Secretary in 1998-1999, Philippine agriculture achieved a record 9.6% growth.

In 2014, he founded the InangLupa Movement Inc. that advocates and calls action for agricultural modernization and rural industrialization anchored on inclusiveness, science-based, resilient, and market-oriented development.

For the second time, he served as DA Secretary (August 2019-June 2022), with the vision of a food-secure and resilient Philippines with empowered and prosperous farmers and fisherfolk.

He has a BS in Agricultural Education from the Mountain State Agricultural College (MSAC), now BSU, in 1973; MS in Agronomy from MSAC in 1976, and Doctor of Philosophy in Horticulture from UPLB in 1980. He was awarded 11 doctorate degrees honoris causa by various higher educational institutions in the country.

Maria Julia Golloso-Gubat is a Senior Science Research Specialist at the DOST – Food and Nutrition Research Institute (DOST-FNRI).

She earned her BS in Nutrition degree from UPLB and MS in Nutrition and Health from the Wageningen University and Research Centre in the Netherlands, where she developed an interest in the human appetite mechanism and worked on understanding the sensory satiety properties of food and consequent intake.

Upon completion of her studies abroad, she helped establish the Sensory Evaluation Laboratory at the DOST-FNRI. She also led the conduct of studies to better understand the physiological mechanism of satiation and satiety with intakes of Brown Rice, and consumption of meals following the recommendations in the *Pinggang Pinoy* food guide.

She initiated the conduct of human gut microbiota intervention studies in the DOST-FNRI. She worked as an active member of the Technical Working Group that developed the Philippine Dietary Reference Intakes (PDRI), zeroing in on B-vitamins including thiamin, riboflavin, and niacin. She also helped develop the Nutrition Practice Guidelines for primary care setting; and the Philippine consensus statement on the use of ketogenic diet and intermittent fasting for weight reduction in adults.

For her doctoral dissertation, she worked on the development of a composite index for the assessment of local food systems, to contribute to data that would drive the formulation of context-specific strategies to improve food and nutrition security in the country.

Director **Shandy M. Hubilla** earned his BS and MS degrees in Agricultural Economics at the University of the Philippines (UP) Los Baños. He is currently pursuing Ph.D. in Public Administration at the UP Diliman.

His fields of expertise and specialization include Agriculture, Economics, Environment and Natural Resources, Research, Rural Development, Project Management, and Environmental Planning.

At present, he is the National Deputy Project Director of DA-Philippine Rural Development Project (DA-PRDP) at the National Project Coordinating Office. In PRDP, he oversees the overall implementation of the Project, four (4) Project Support Offices, and 16 Regional Project Coordinating Offices across the country.

He also serves as the National Program Director of the Farm and Fisheries Clustering and Consolidation Program (F2C2).

Mr. EDUARDO N. REYES JR. has spent more than three decades in the Land Bank of the Philippines (LANDBANK) holding various positions in lending, branch banking, and accounting operations. His vast experience equipped him to lead the LANDBANK Nueva Ecija Lending Center, his current position since 2011.

He was appointed as Career Executive Service Officer VI by the Career Executive Service Board (CESB) in 2007.

Before working at LANDBANK, he served as an agricultural researcher at the Office of the Provincial Agriculturist in Nueva Ecija.

He earned his degree in BS Agriculture from the Central Luzon State University and completed his Master's degree in Public and Business Management at the Nueva Ecija University of Science and Technology.

Rowena Del Rosario-Sadicon is a seasoned entrepreneur, philanthropist, educator, wife to an Artist, mother of three, and a staunch rice industry advocate who actively promotes the best interests of Filipino consumers and farmers. She supports local rice producers through her companies by procuring directly from them.

She is also the Founder and Lead Convener of the Philippine Rice Industry Stakeholders' Movement (PRISM), a forum and an advocacy group that provides a platform for all stakeholders in the rice value chain to voice out their interests and concerns.

She holds the top leadership positions of the Nueva Ecija-based Victor Del Rosario Rice Mill Corp. (VDRMC) and Bulacan-based Silverice Trading Corp. She sits as the President and CEO of these corporations. Prior to becoming the CEO, she served in these corporations as corporate treasurer, director, VP for Marketing, Customer Service Manager, International Trade Officer, and Managing Director.

She also serves as member of the Board of Directors of Hino Motors-Nueva Ecija in San Leonardo since December 2018. She is the Founder, Managing Director, and Administrator of The School of Academics & Arts in Makati City since 2016.

PLENARY PANEL SESSION 3. *GANADO*

The session provides a venue to shed light on approaches and initiatives in expanding farmers' participation in the rice value chain, both as producers and commercial contributors. It also centers on successes and challenges of farmer-entrepreneurs, and elaborates on techniques for a farmer to be successful in his/her business ventures.

GANADO: Motivated and Enthusiastic Farmer-entrepreneurs in the Rice Value Chain

Dr. AURORA M. CORALES
DA-PhilRice

GANADO works toward cultivating a community of motivated and enthusiastic farmer-entrepreneurs within the rice value chain. The primary objective is to amplify farmers' involvement in the value chain, positioning them not only as cultivators but also as vital contributors to the commercial aspects of rice production, agribusiness, and agro-industrialization.

It unfolds through a multi-faceted approach, encompassing strategic action areas. Firstly, key stakeholders within the rice value chain are identified and engaged in a collaborative effort to forge a shared vision and unified goals. This cooperative endeavor lays the foundation for a cohesive and synergistic partnership among all involved parties.

Market intelligence assumes a central role in decision-making, and in guiding production and processing strategies. Rigorous market assessments are conducted to create strategic choices, ensuring alignment with market demands and opportunities.

The initiative similarly advocates for the enhancement of production and processing practices. Support is provided to farmers in adopting modern, sustainable agricultural techniques, and refining processing methods to attain superior quality and value addition in the final product.

In tandem with these efforts, it underscores the imperative of developing a robust infrastructure that bolsters the entire rice value chain. Investments are directed toward critical components such as advanced irrigation systems, state-of-the-art storage facilities, efficient transportation networks, cutting-edge processing mills, and the establishment of comprehensive market information systems.

By mobilizing these strategic action areas, it envisions a transformation in the rice value chain, empowering farmers to become dynamic and resilient entrepreneur-players. This holistic approach not only amplifies agricultural productivity but also fosters economic sustainability and community development. Ultimately, GANADO aspires to contribute to the broader goals of food security and agricultural prosperity.

A seasoned PhilRice scientist, agricultural engineer, and development worker, **Dr. Aurora M. Corales** has spent over two decades pushing for initiatives that matter to farming communities.

Her career began through her involvement in the Philippine Cotton Corporation in 1981, Philippine Rural Reconstruction Movement in 1992 to 1998, and finally at PhilRice from 2000 to 2023.

She was involved in various PhilRice programs. She is best remembered for her leadership in the Rice Business Innovations System (RiceBIS) Community Program, which helps rice farmers improve their income through agripreneurship. This initiative brought her and her team to the list of esteemed national projects that received the Civil Service Commission's (CSC) Presidential Lingkod Bayan Award in 2022.

She also received numerous accolades, including the Outstanding R&D Staffer (Level 2) award and the CSC Pagasa Award in 2006, and the PhilRice Executive Director's Award in 2014. Her immense contribution in rice research, development, and extension helped her become Scientist I in October 2020.

She obtained her BS in Agricultural Engineering in 1980 and MS in Rural Development in 1996 at CLSU, and PhD in Community Development in 2010 at UPLB.

Dr. Corales is married to Mr. Rizal G. Corales and they have three children – Helen Valerie, Laarni Grace, and Minerva.

PLENARY PANEL SPEAKERS / DISCUSSANTS

Dr. Fermin D. Adriano is a highly accomplished academician, scholar, writer, and policy adviser to key government officials. He once served as Information Director of the UP System, and Vice Chancellor of UP Los Baños, where he took an early retirement with the rank of Professor.

He was Board Member of the former Manila Chronicle while at the same time serving as its Editorial Consultant and regular columnist. He writes a weekly column for the Manila Times. He had published several scholarly books and articles on Mindanao development issues, Bangsamoro peace and conflict concerns, rural development, agriculture, and agrarian reform.

He was policy adviser to successive Secretaries of Agriculture, Secretary of Agrarian Reform, and successive presidential assistants/advisers for Mindanao, and Press Secretary.

He used to be a board member of the Southern Philippines Development Authority, and served as a member of the Advisory Council of the Asian Development Bank Institute (ADBI) (based in Tokyo, Japan) for four years, the Human Security Advocates, and Madre de Amor Hospice Foundation. He is a member of the Management Association of the Philippines (MAP) and policy adviser and Fellow of the Foundation for Economic Freedom (FEF), Inc.

Cheryl Marie Natividad-Caballero is a social innovator, technopreneur, and development catalyst with extensive experience in project design, systems thinking and strategic planning, and information technology management.

She has an AB in Philippine Studies, major in Sociology and Psychology, and Master's degree in Technology Management from UP Diliman; and units leading to the degree MA in Sociology. She also completed a Certificate program in Information Technology at the NIIT-ePLDT.

She is the Founding President and CEO of Optiserve Technologies Inc., where she had 16 years of hands-on experience in strategic management and business development as she also served as Managing Director and Project Manager. She also serves as DA-PhilRice Technical Consultant.

Her first position at the DA was Head Executive Assistant and was designated as Undersecretary and Chief of Staff (COS); USec for Agri-Industrialization and Fisheries from November 2021 to June 30, 2022. She led the crafting of strategic programs/activities/ projects in accordance to the Agriculture and Fisheries Modernization Plan. She also set policies and formulated standards for the effective, efficient, and economical operations of the fishing industry.

She is an advocate of "Agribusinessizing Agriculture" having assisted cooperatives, wounded soldiers and indigenous peoples, specifically the Aeta communities with the aim of attaining high productivity and increasing income.

Dr. Rex L. Navarro is an international expert in agricultural extension, development communication, social marketing and mobilization, knowledge-sharing and management, development administration, rural development, and strategic planning. Trained at the Tulane University in New Orleans, USA, he holds BS and MS degrees in Development Communication shifting from BS Agriculture at UP Los Baños (1975 and 1982) and a Doctorate in Public Administration from UP Diliman (1992). He had also a direct ground experience in agriculture through his diversified hybrid rice *Palayamanan* farm in Cagayan.

He has a deep and comprehensive understanding of the contemporary state and challenges of the DA's research and extension system. As a Senior Consultant of PhilRice, he also catalyzed the crafting of a refreshed strategic plan for the national rice research for development system in 2023 to 2028. As Senior Technical Adviser of the DA-Bureau of Agricultural Research (DA-BAR), he initiated the idea of a synchronized DA innovation system through a unified DA R4DE Agenda and Programs to optimize the impacts of the Department in enhancing the productivity, resiliency, and competitiveness of Philippine agriculture.

Moreover, Dr. Navarro co-led a team in analyzing the Philippine agri-fishery landscape. As a Volunteer Advisor, he helped develop the concept and spearheaded the implementation of a decentralized mode of agri-fishery extension through Province-led Agriculture and Fisheries Extension Systems (PAFES) with Ilocos Norte as the first pilot province. In fisheries, he was the RD&E specialist in mapping out a feasibility study for the World Bank-assisted Philippine Coastal Resiliency (FishCORE) project.

He is a member of the Board of Trustees of the Philippine Agriculture Research Foundation, Inc. (PARFI), UPLB College of Agriculture and Food Systems Alumni Association (CAFSAA), Coalition for Agricultural Modernization of the Philippines (CAMP), and Asia Rice Foundation (ARF). Likewise, Dr. Navarro held key positions in research and extension agencies in the Philippines such as Director of the Agricultural Training Institute (ATI); Director of the Institute of Development Communication, UPLB; Program Leader/Department Manager, Technology Transfer, PhilRice; Head, Communication and Documentation Dept., Cotton Research and Development Institute; and Extension Information Coordinator, Planters Products, Inc.

At the international front, he was a Consultant of the CGIAR Research Program on Climate Change, Agriculture and Food Security for Southeast Asia (CCAFS-SEA) hosted by the IRRI. He was also the Special Assistant to the Director General, and Director of Strategic Marketing and Communication at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) based in India. Similarly, he was a consultant of various international organizations (e.g., Asian Vegetable Research and Development Center, Asian Development Bank (ADB), European Union, German Corporation for Technical Cooperation (GTZ), Southeast Asian Regional Center for Graduate Study and Research in Agriculture, and US Agency for International Development. He has worked in Southeast Asia (Cambodia, Indonesia, Lao PDR, Myanmar, Philippines, Thailand, and Vietnam), South Asia (India and Bangladesh), South Pacific (Fiji and Papua New Guinea), Eastern Africa (Kenya), Southern Africa (Malawi, Mozambique, Tanzania) and West Africa (Niger and Mali).

PLENARY PANEL SESSION 4. NAPAPANAHON

The session focuses on farmers' and other rice stakeholders' access to services, information, and interventions. It will discuss harnessing the capabilities of digital transformation in rice cultivation.

NAPAPANAHON: Timeliness and Relevant Focus on Digital Transformation

Dr. EDUARDO JIMMY P. QUILANG
OIC-ODEDR, DA-PhilRice

It is anchored on the critical importance of timeliness and relevance in driving digital transformation within the agricultural sector. The overarching objectives are to streamline access to services and information for farmers and stakeholders, while simultaneously minimizing transaction costs and ensuring the effective delivery of services and interventions.

The proposed action areas are structured to catalyze this transformation. Firstly, the establishment of a comprehensive data ecosystem is advocated, encompassing information on farmers and their respective areas. This reservoir of data serves as a linchpin for evidence-based policy-making and strategic decision-making processes.

The collaborative approach takes center stage, with an emphasis on fostering multi-agency cooperation fueled by the data ecosystem. This collaboration extends across the entire agricultural value chain, from input providers to end-market access, encompassing service providers, financing institutions, insurance providers, and marketing channels.

Furthermore, it prioritizes linking interoperable systems, ensuring seamless integration for efficient planning, programming, execution, monitoring, and real-time reporting. This integrated approach not only enhances operational efficiency but also facilitates agile response mechanisms.

Promoting the adoption of smart agricultural technologies emerges as a pivotal thrust, with a specific focus on innovations such as the use of drones for direct seeding, as well as application of fertilizers and pesticides. These technologies promise to revolutionize farming practices, optimizing resource utilization and environmental sustainability.

Besides technological advancements, it advocates for capacity-building initiatives. These efforts encompass the refinement of skills among specialists, trainers, and farmers alike, facilitated through both interpersonal and online platforms. This dual approach ensures that stakeholders are equipped to harness the full potential of digital tools and technologies.

By marshaling these strategic areas, NAPAPANAHON envisions a paradigm shift in agricultural practices, characterized by a dynamic, data-driven, and digitally enabled ecosystem. The emphasis on timeliness and targeted focus in digital transformation not only enhances agricultural productivity but also augurs well for the overall socio-economic development of farming communities. Ultimately, this initiative contributes to the broader goals of agricultural sustainability and food security in an ever-evolving digital landscape.

Dr. Eduardo Jimmy Pua Quilang is the Officer-in-Charge at the Office of the DA-PhilRice Deputy Executive Director for Research while holding the position of Chief Science Research Specialist.

He has a PhD in Agricultural Sciences from Kyushu University; MS in Agricultural Meteorology with a minor in Agronomy at UP Los Baños; and BS in Agricultural Engineering with a major in Land and Water Resources Engineering and Technology, also from UPLB.

He has completed the Executive Masterclass in Digital Transformation, a graduate program that equips leaders with the skills to navigate the complex landscape of the 4th Industrial Revolution. This was developed under an educational partnership between Union Bank and Global Learning Solutions Singapore.

Additionally, he is a Career Executive Service Eligible (CESE) conferred by the Career Executive Service Board (CESB) and a proud graduate of the Senior Executive Class of the Public Management Development Program at the Development Academy of the Philippines (DAP).

His dedication and contributions to the field have been consistently recognized, exemplified by the prestigious Digirati Distinction Award (2023) and the Scientific Productivity Award (2022), among numerous other accolades.

PLENARY PANEL SPEAKERS / DISCUSSANTS

Assistant Professor **Anthony James C. Bautista**, PME, MBA, PhD is a faculty researcher in Agricultural Robotics, Precision farming, and Development of Service Robots at the University of Santo Tomas. He helped develop the GPS-guided Autonomous Hand Tractor funded by DOST-PCAARRD and the Unmanned Aerial Vehicles deployment system for water quality monitoring funded by DOST-PCIEERD.

His major recognitions include: 2021 Gregorio Y. Zara Award for Applied Research (NAST and Philippine Association for the Advancement of Science and Technology); 2020 Living Heroes for Technology (J. Amado Araneta Foundation), Innovation Series for his valuable efforts and leadership in developing the Logistic Indoor Service Assistant Telepresence Robot in the middle of COVID-19 pandemic; and 2020 Ginebra *Lalaban Ako* Award, 1st runner up. He was listed as one of Asia's most outstanding researchers for 2022.

His advocacy includes inspiring the youth to learn and use robotics technology to solve practical problems in the society. He was recognized with the Community Outreach Award during the 2022 eLearning Forum Asia for his exemplary practices.

He received his BS in Mechanical Engineering from Don Bosco Technical College Mandaluyong in 2003; Master of Engineering from the Mapua University Manila in 2008, and Doctor of Technology from TUP Manila in 2014. His postdoctoral studies about agricultural robotics and precision farming were at Harper Adams University, United Kingdom in 2017 and about indoor navigation using LIDAR and visual sensors in Toyohashi University of Technology, Japan in 2019.

Mr. DINDO KING M. DONAYRE is a Senior Science Research Specialist and a Career Scientist I at the Crop Protection Division of DA-PhilRice. He is a graduate of MS in Plant Pathology at the University of the Philippines Los Baños; bachelor's degree in Agriculture, major in Plant Protection, from the Visayas State University.

As a weed scientist, his scientific works focus on the development, implementation, and promotion of effective and economical weed management strategies in the Philippines. As a testament to his works, he has published books, book chapters, scientific papers, other knowledge products, and utility models. He is also instrumental in the development E-damuhan, a weed identification and management app.

Mr. Donayre is often invited as technical resource person in trainings, seminars, and radio interviews, for topics on common weeds of rice and their management. Often tapped as co-advisor, he mentors college and high school students who wish to explore weed science researches.

He has received numerous awards, among them the Marcos Vega Memorial Award in Weed Science given by the Weed Science Society of the Philippines (2015) and Outstanding Senior Researcher awarded by DA-PhilRice (2016).

He is currently the program leader of SMART Farm (Scaling Modern and Adaptive Rice Technologies for Prosperous Farming Communities).

Dr. Jonathan V. Fabula finished his BS and MS in Agricultural Engineering at the Central Luzon State University in 2006 and 2011. He earned his PhD in Biological and Agricultural Engineering at the Kansas State University, USA in 2021 as a DOST-Engineering Research and Development for Technology (DOST-ERDT) Foreign PhD scholar. He was also a recipient of the Biological and Agricultural Engineering Graduate Student of the Year Award from the same university.

He is an Associate Professor I and currently serves as the Director of the CLSU–Precision and Digital Agriculture Center. He headed the Land and Water Resources Management Center in 2022. He also held the positions Instructor I (2014-2019) and Instructor III (2019-2021) at the CLSU-College of Engineering. He served as Engineering Assistant A (2011-2013) and Engineer B (2013-2014) at Balog-Balog Multipurpose Project – National Irrigation Administration in Tarlac.

He received the Educational Aids Blue Ribbon Award from the American Society of Agricultural and Biological Engineers in 2020. He has authored various journal and research/extension articles that focus on precision agriculture.

Dr. Fabula is a member of the Philippine Society of Agricultural and Biosystems Engineering (PSABE), American Society of Biological and Agricultural Engineers (ASABE), and International Society of Precision Agriculture (ISPA).

Dr. Luis Rey I. Velasco is a Laguna native who finished his BS in Agriculture major in Entomology (1978) and MS in Entomology cognate in Ecology (1982) from UP Los Baños; PhD in Entomology from the University of Queensland, Brisbane, Australia in 1990. He was a recipient of a UQ Research Scholarship in 1984 to 1988. He was also a Nihon University Exchange Fellow in November 1999.

He has been active and accumulated extensive experience in the academe (instruction) and research management. He is currently an Adjunct Professor at UPLB, where he also served as a former Dean of the College of Agriculture (1999 to 2002) and Chancellor (November 2005 to October 2011). He currently serves as a consultant for the Bureau of Plant Industry, LEADS Agricultural Products Inc. and LEADS Animal Health Inc., SUMIFRU Phils., and San Miguel Animal Health – UPLB FI Project. He is also a Board Member of the ANI Inc., Green Energy Inc., DA-PhilRice, and Miyakonojo Higashi High School, Miyasaki, Japan. He is also President of the Japan-Asia Development Foundation Inc.

His most recent awards are the Outstanding Researcher under College of Agriculture and Food Science, UPLB (2020), Pest Management Award for Instruction from the Pest Management Council of the Philippines (2019), One UP Award, and UP Publication Awards. He was also a recipient of UP Scientist Award (2015-2017).

He is happily married to Dr. Ma. Theresa H. Velasco and they are blessed with two children and two grandchildren.

PLENARY PANEL SESSION 5. FARMERS' BEST PRACTICES AND EXPERIENCES

The session will zero-in on on-farm best practices and actual experiences on productivity, clustering and consolidation, crop diversification, improved quality, and better income. Tips on modernizing integrated rice-based farming will also be provided.

FARMERS' BEST PRACTICES AND EXPERIENCES

Director U-NICHOLS A. MANALO
Officer-in-Charge, Field Operations Service
Department of Agriculture

Theme goes into the pivotal role of knowledge-sharing and best practices in the realm of agriculture, focusing on the collective wisdom, techniques, and strategies employed by Filipino rice farmers. With a multifaceted objective encompassing economic, social, and environmental dimensions, this endeavor seeks to enhance productivity, sustainability, and profitability in agricultural pursuits.

The rice industry in the Philippines commands a significant economic footprint, amounting to 404 billion pesos. While the sector has shown commendable growth at 1.78% annually over the past five years, it remains besieged by daunting challenges. A substantial portion of rice farmers grapple with low productivity and high production costs, exacerbated by disruptions in the global food supply chain, particularly in the wake of conflict-induced constraints.

Despite record-high production in 2021, with nearly 20 million tons harvested from approximately 4.8 million hectares, average yields hover around 4.15 tons per hectare. However, many rice farmers still face economic hardships due to limited participation in the value chain, compounded by the vulnerability to natural calamities stemming from a changing climate.

The average Filipino rice farmer, aged around 56 years, plays a vital role in sustaining households of five members on average. With an average of three decades of farming experience and predominantly a high school education, they serve as the backbone of the agricultural landscape. More than half are organized, but only a fifth have accessed trainings and seminars in the past five years.

While 56% own the land they cultivate, over 80% rely on rice farming as the primary source of household income, generating approximately P257,000 per year. Access to information, facilitated by smartphones and the internet, holds promise for knowledge dissemination, with 79% having household members with smartphone access, 62% with internet connectivity, and 61% expressing a willingness to receive information online.

In their pursuit of greater yields, Filipino rice farmers aspire to achieve a 41% increase, demonstrating their commitment to elevating agricultural practices that will underscore not only the critical need to secure their livelihoods but also to fortify the resilience and sustainability of the broader agricultural sector.

Mr. U-Nichols A. Manalo is currently the OIC Director of the DA-Field Operations Service, mandated to serve as the coordinating body or functional link of the Central Office to the Regional Field Offices, Bureaus, Attached Agencies, and other offices. His role revolves around ensuring the efficient implementation of programs and the timely delivery of public goods and services. He is also the DA National Corn Program Director in a concurrent capacity.

Among his notable positions at DA include: Director for Operations at the National Capital Region (NCR), Director of the DA's High-Value Crops Development Program, Director of the DA Systems Wide Climate Change Office, OIC Regional Executive Director of DA Region 8 based in Tacloban City, and Chief of the Special Projects Coordination and Management Assistance Division.

He earned BS in Agricultural Economics at UPLB in April 1997; Master's Degree in Agricultural Science in March 2013 at the Graduate School of Agricultural Science in Tohoku University in Japan. He also completed the 2022 USDA Norman Borlaug Fellowship Program at the Louisiana State University, USA.

His areas of interest include Rural Development, Agricultural Extension, Organic Agriculture, Climate Change Adaptation and Mitigation, Disaster Risk Reduction and Management, and Human Security.

PLENARY PANEL SPEAKERS / DISCUSSANTS

Mr. Leo Franco L. Ebardo was born in Bayugan City, Agusan del Sur. He finished BS in Computer Engineering at the Mindanao State University – Iligan Institute of Technology in 2013. A computer engineer by profession and a farmer by passion, he is a 2015 alumnus of the DA-PhilRice Rice Boot Camp.

In December 2018, he and his brother approached DA-PhilRice Agusan and expressed interest in joining the RiceBIS Phase 1 in Esperanza, Agusan Del Sur. He joined the training on inbred seed production and certification, and became an active member of the RiceBIS Seed Production Cluster. Together with other cluster members, they organized the Esperanza Seed Growers Farmers' Association, which they eventually registered as Esperanza RiceBIS Producers Cooperative (ESRIPCO) on 19 August 2019.

He is a rice farmer-businessman since 2013 and became a seed grower in 2019. In addition to being ESRIPCO's Treasurer, he also serves his community as a Barangay Kagawad and as the auditor of the Bucac Farmers Association.

Frianina V. Resplandor is from Guimba, Nueva Ecija. She earned her BS Business Administration degree from the University of the East, Manila in 1991.

Certified by The Association of Productivity Specialists, New York, she has worked with various multinational corporations in Southeast Asia, Europe, and North America. She was a Managing Director at the Allied Empire Company Ltd. Hongkong (215-2019); an independent management consultant (2012-2015); Management Consultant at Pt. Renoir Consulting, Indonesia (2010-2012); and Unit Vice President for Operations at Impac/Asia Control Systems Phils. (2005-2010). She handled projects relating to construction, cement manufacturing, oil and gas (Philippines); gloves (Sri Lanka); furniture, retail, plastic extrusion, bus assembly, semi-conductor, musical instrument, construction, baby walker and tricycle, electronics, oil and gas (Indonesia); food processing, plastic bag and wood manufacturing, plastic packaging (Vietnam), semi-conductor, battery manufacturing (China), and rubber and plastic film (Thailand).

Nina has expertise in improving production yield, reduction of costs, and managerial capability of corporations. She is the current Farm School President and Master Trainer at Myriad Farms Agri-business Skills Training and Assessment Center Inc., and the Managing Partner of Myriad Farms.

She also serves as President of Sakalipunan ng mga Organikong Magsasaka ng Nueva Ecija; Vice President of the Association of Learning Site Agripreneurs, and Bagong Alyansa ng mga Learning Site Agripreneurs; and Organic Agriculture Sectoral Representative of PAFC Nueva Ecija.

Jhimcelle V. Salvador serves as Training Specialist III of the Agricultural Training Institute – Regional Training Center 2. He has served the Center in various capacities: Training Officer I (2014-2015); and Development Management Officer I (2015-2018) and II (2019-2022). He was an Agricultural Technologist in 2013 under the BPI-Baguio National Crop Research and Development Center.

He is a licensed agriculturist. He also holds an NC III Agricultural Crops Production, and Trainers Methodology Level I.

He was a consistent scholar during his undergraduate and graduate studies. He earned his Diploma in Agricultural Technology (2011) as a CHED Scholar; Bachelor in Agricultural Technology (2013) as a Youth in Agriculture and Fishery Program (YAFP) scholar. He earned his Masters in Public Administration (2023) from Northeastern College. He is currently pursuing his Masters in Agricultural Sciences major in Crop Science at the Isabela State University Echague Campus as an ATI EDGE scholar.

His awards include Exceptional Performance Award ATI Rice Program (2017) and one of the top three RSTC participants of batch 2019.

He is happily married to Jokrisma May Ann Vibal-Salvador, with two children: Erin Kriscelle (9) and Jhim Alfonso (3).

Hazel A. Tanchuling is a 1993 alumna of UP Diliman; BS Community Development. She heads the Rice Watch Action Network (R1) since its constitution in 2004. She also chairs the Philippine Council for Agriculture and Fisheries (PCAF) National Sectoral Committee on Rice; Interim Chair of the Gender Equality and Social Inclusion Committee.

She has around 30 years of development work experience focusing on rural/community development, agriculture policy, governance, public finance advocacies, sustainable livelihoods, food security issues, climate change adaptation, and resilience building in agriculture.

She is a recipient of the 2022 Pillar of Agriculture and Fisheries Award given by the DA-PCAF, and the 2015 Wind Vane Award given by DOST-PAGASA.

Under her leadership, R1 received international recognition for its work on climate change. In 2020, R1 was among Start Network's 10 International Change-Makers. R1 took home the Lasting Systemic Change Award. The Network is a global consortium of humanitarian agencies with headquarters in the UK. R1's program on Climate Information Services and Climate-resiliency Field School was also one of the finalists in the 2018 Gender-Just Climate Solutions Award (Transformational Solutions Category) given by the Women and Gender Constituency of the UN Framework Convention on Climate Change (UNFCCC).

ENGR. ROMEO S. VASQUEZ, CEO of the RSVasquez Enterprises and a son of San Mateo, Isabela earned his BS in Agricultural Engineering at the Central Luzon State University in 1985. He had double jobs in Manila as sales representative and as a jeepney driver at night. He saved all his extra earnings and commissions to buy farm lots. While he remained employed in the fertilizer company, he started cultivating his one-hectare palay farm in San Mateo. In 1990, he created RS Vasquez Enterprises as a full-time palay trading, rice milling, and seed production business.

He was designated as Hybrid Rice Mover (One-Peso Consultant) under then Agriculture Secretary Luis Lorenzo and served in the DA-PhilRice Board of Trustees as Agribusiness Sector Representative since 2017. He is also part of the Technical Working Group for the Golden Rice Program as Farmers Sector Representative since 2020. He also serves as a Technical Consultant for the Local Agricultural Machinery Assembly Manufacturing in the Philippines (LAMMP) Roadmap Project.

His most notable awards are from the Landbank of the Philippines, specifically the regional and national Gawad Entrepreneur in 2015 to 2018; and the DA Regional Gawad Saka for Outstanding Agri-Entrepreneur in 2014. He also received the 2018 Gintong Butil Award; 2014 Outstanding Citizen of San Mateo award; and Agri-Entrepreneur Gold Award as Outstanding Farmer in the Philippines (TOFARM) in 2013.

He is happily married to Ms. Josefa Consuelo Bongon-Vasquez and they are blessed with three children: Arvie Joie (34), Arjay Rusell (33), and Ardell Justin (25).

ABSTRACTS OF PAPER PRESENTATIONS

CONCURRENT SESSION 1.
CLIMATE CHANGE ADAPTATION

Mitigating initiatives for climate change-vulnerable rice-farming communities under Rice SUSTAIN (Sustainable Technologies and Appropriate Information Needs) Project for increased productivity in Bicol and Eastern Visayas Regions

Gina B. de Mesa, Denise Bianca Y. Sadullo, Loven Babes O. Rafallo, Marie Antoinette R. Orbase, Jielay O. Mosquite, Zarah Lyn F. Tamang, Christian Barcelon, Rona T. Dollentas, and Victoria C. Lapitan

DA-PhilRice Bicol

Farming communities in Bicol and Eastern Visayas are vulnerable to climate change impacts. This is specifically true for areas considered as stress ecosystems such as those that are flood-, submergence-, drought-, and saline-prone. Poor access and non-adoption of recommended technologies exacerbate impacts of climate change. Despite advances in rice farming, the average yield in these regions remains at around 3.5 t/ha. The Rice SUSTAIN project was proposed to increase and sustain the competitiveness of rice farmers in the regions through intensive and pro-active promotion and dissemination of sustainable technologies and appropriate information needs. Mitigation initiatives were implemented through (1) gender-based capacity enhancement activities on rice and rice-based farming, (2) mass-based information dissemination and digital-based promotional activities (3) technology demonstration farms, and (4) scaling of appropriate technologies addressing low production constraints. Since 2018, some 4,534 clients have been reached by the project's capacity enhancement activities, one of which is a training on the PalayCheck System. Information campaigns through One-Stop Information Shop, exhibits, field days, seminars, text center, and FB-page disseminated valuable information to 48,588 clients from 2018 to 2022. Promotion and enhancing availability and access to high-quality seeds, especially varieties for adverse environments, have been the foci of on-station varietal demonstration and 83 Binhing Palay Farms. The scaling of Integrated Crop Management (ICM) for saline environments resulted in an increase of 0.51 t/ha from the baseline yield of 3.22 t/ha and a reduction in fertilizer input of 3-4 bags/ha fertilizer. Continuous training and updating of rice and rice-based appropriate technologies for Bisakol (Bisaya and Bikolano) farmers is the core implementation of the branch development initiatives to achieve wider transformational impact.

Keywords: Bisakol (Bisaya and Bikolano farmers), mitigation, location-specific, adverse environment, scaling

Profiling farmer-grown rice genotypes in the Philippines

Rhemilyn Z. Relado-Sevilla[1], Roseleen M. Capiroso[1], Imelda A. Arida[2], and Jesusa C. Beltran[1]

[1]DA-PhilRice; [2]Department of Agriculture

The National Seed Industry Council has approved and released 387 rice varieties since 1995. The Rice-Based Farm Household Survey of PhilRice shows that farming households use traditional and modern varieties. However, "unclassified" varieties existed in every survey round and were not reported as traditional or NSIC-released. It cannot also be determined if they were just differently named for popularization, rice lines that were still under study or yet to be released, or other genotypes that were not part of the formal seed system. Hence, this study profiled "unclassified" varieties that were collectively referred to as "farmer-grown rice genotypes" (FGRG). Some 44 provinces in 15 regions were surveyed using a standardized survey questionnaire. To further validate the survey results, key informant interviews were conducted. Farmer-respondents reported FGRGs yield as high as 9.5t/ha in WS 2016 and 10.8t/ha in DS 2017. The top-yielding FGRG for WS 2016 was *Nitoy* planted in Central Visayas and *IR-46* in Cagayan Valley for DS 2017. There were, however, FGRGs that yielded below the national average (3.8t/ha in WS 2016 and 4.1t/ha in DS 2017). Two major reasons for cultivating the varieties were good eating quality and yield performance. FGRGs were sourced from co-farmers mainly through seed exchange (53%), own produce (24%), and various sources such as seed growers (8%), DA technicians (2%), or paddy traders (2%). FGRG net profit was higher across seasons since farmers benefitted further when they were perceived as special rice by buyers. The proliferation of FGRGs confronts the national formal seed system given that some were found to be genetically similar to released varieties. In this case, there should be a stringent measure to penalize groups or individuals that intentionally mislabel a registered variety for personal gains. However, for unique FGRGs that perform better than released varieties, seed purification and community seed banks would be critical interventions.

Keywords: farmer-grown rice genotypes, unclassified varieties, RBFHS

Emerging outcomes of the Philippine RCEF Seed Program in its mid-term implementation

Thich Eloise Paris, Ranxel M. Almario, Mary Joy V. Ang, Chona P. Austria, Marco Antonio M. Baltazar, Jonabel T. Batang-e, Robinson F. Berba, Marinelle C. Espanto, Adrielle C. Flores, Nefriend M. Francisco, Reybert C. Francisco, Kristel Anne L. Gonzales, Danreb A. Majan, Rowena G. Manalili, Byronne C. Mendoza, Aphrodite A. Ortiz, Dexter Lloyd G. Portera, Ronnel R. Surat, Roy F. Tabalno, and Jesusa C. Beltran

Socioeconomics Division, PhilRice CES

The RCEF Seed Program stands as a pivotal intervention aimed at strengthening the sustainability and competitiveness of Filipino rice farmers in the face of trade liberalization. Recognizing the need for sound data to substantiate the attainment of our set target outcomes, a mid-term monitoring and evaluation effort has been initiated. This is geared toward establishing a robust database that captures the emerging results of the Program's implementation. The study covered the 2021 WS and 2022 DS cropping periods across the 41 RCEF Seed provinces. Two-stage stratified sampling was employed and a minimum quota of 100 rice farmers per province was set, with the requirement that at least 30 farmers received seed support from the Program. This allowed the survey to provide estimates that are within 5% of the true population value at a minimum confidence level of 90%. The project also used baseline data information from the 5th Survey Round of Rice-Based Farm Household Survey, RBFHS for the Additional 18 Provinces, and Baseline Information Survey of RCEF Rice-Based Farm Household Beneficiaries on the 23 Provinces. Results showed a sustained Certified Seeds (CS) adoption from 40% in 2019 DS to 82% in 2022 DS, and 45% in 2019 WS to 83% in 2021 WS. Majority of the farmer-respondents in 2021 WS and 2022 DS enjoyed free CS from the Program with 76% and 81% of the samples, respectively. From the total RCEF seed recipients at 76% in 2021 WS, 97% utilized RCEF seeds in their farm areas, while only 3% did not plant them. In 2022 DS, 96% were planters, while 4% were non-planters. Yield improvements were also observed in both seasons, from 3.63 t/ha in 2019 DS to 4.11 t/ha in 2022 DS, and from 3.72 t/ha in 2019 WS to 3.89 t/ha in 2021 WS. The emerging outcomes of the Program in its third year of implementation were demonstrated through its increased adoption of high-quality seeds, extensive reach, reduced seeding rates, and improvement in yield levels. This signifies a positive trajectory for the Program, indicative of its growing effectiveness and positive impact on the agriculture sector.

Keywords:

Search for climate-resilient rice varieties with multiple adaptation to irrigated and adverse rice systems

Christopher C. Cabusora, RJ D. Buluran, Raña Mae A. Sumabat, and Nenita V. Desamero

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In 2021, 16 rice varieties, i.e., 6 Sahod Ulan and 10 Salinas, were evaluated for field performance under non-stress, submergence, managed-drought, and simulated rainfed conditions. Sahod Ulan (SU) varieties are tolerant to rainfed-drought while Salinas (Sal) varieties are salinity-tolerant. The evaluation identified varieties with multiple adaptations to various ecosystems. Once identified, use of these varieties would form part of the adaptation strategies in rice cultivation vis-a-vis climate change impacts. Under irrigated growing conditions, 5 SU and 6 Sal rice varieties were identified. They had a yield advantage ranging from 2% (8.52 tha^{-1}) to 36% (11.36 tha^{-1}) over the check variety, NSIC Rc222 (8.14 tha^{-1}). Under managed-drought, 15 test varieties yielded 2% (2.04 tha^{-1}) to 66% (3.31 tha^{-1}) higher than the check variety, NSIC Rc222 (2.00 tha^{-1}). Under rainfed, 4 SU and 7 Sal varieties with yield advantage of 5% (2.17 tha^{-1}) to 165% (3.76 tha^{-1}), in reference to NSIC Rc222 with yield of 2.12 tha^{-1}, were identified. Under submergence, survival of the SU varieties was 6% to 62%, and 6% to 58% for the Sal varieties. Grain yield under submergence of the 4 SU was 21% (1.37 tha^{-1}) to 207% (3.46 tha^{-1}) higher than the check variety, NSIC Rc194, which yielded 1.13 tha^{-1}. Whereas, among the Sal varieties, 4 had yield advantage over NSIC Rc194 by 18% (1.33 tha^{-1}) to 150% (2.82 tha^{-1}). Genotyping confirmed the presence of the Sub1 gene and the Saltol QTL in 4 (67%) SU and 5 (50%) Sal varieties. The results initially identified 3 SU varieties, namely SU 13, 17 and 18, adapted to rainfed-drought, irrigated and submergence-prone rice ecosystems, and 2 Sal varieties, viz., Sal 3 and 8, adapted to saline-prone, irrigated, and submergence-prone. The identified varieties will be evaluated further.

Keywords: rainfed, drought, submergence, saline, multiple adaptation

Fertile lands: Performance of fertilizers in rice production

Wilfredo B. Collado, Leylani M. Juliano, Rose Ann R. Manlusoc, Ailon Oliver V. Capistrano, Jovino L. De Dios, Jesusa C. Beltran, Marco Antonio M. Baltazar, Jan Pauline A. Jove, Marilyn M. Yere, Angelica L. Purganan, Fernando D. Garcia, Aileen Joy S. Mateo, Cielo Luz C. Mondejar, June Nill F. Paclibar, Caryl S. Agting, Jim Paolo C. Gasta, Peter Lyod P. Sabes, Mark Anthony B. Macadildig, Eduardo Jimmy P. Quilang, and John C. De Leon

DA-PhilRice

Achieving balanced nutrition in rice production can be challenging and reducing the impact of fertilizers on climate change, but it can be done with proper nutrient management and use of other products essential in increasing nutrient-use efficiency. PhilRice evaluated different fertilizer products approved by the Fertilizer and Pesticide Authority across 6 agroclimatic zones for 4 seasons. We aim to generate information for a profitable, sustainable, and environment-friendly nutrient management package of technologies. The nutrient management protocols were grouped into: inorganic (NM1), inorganic + biostimulants (NM2), inorganic + biostimulants and biofertilizers (NM3) with PhilRice nutrient management protocol (control) and farmers' practice (FP) as comparison. Yield during the dry season (DS) was high in NM3 (7.02t/ha) followed by NM1 (6.45t/ha) and NM2 (6.29t/ha) compared to control (5.99t/ha) and FP (5.33t/ha). However, in the wet season (WS), no significant yield differences were obtained across nutrient management protocols (5.24-5.58t/ha) with NM3 obtaining the highest yield. Fertilizer cost during the DS was highest in NM2 and lowest in FP; and the WS highest cost was recorded in FP and lowest in NM1. Average cost of producing paddy rice was high in FP in both seasons (P10/kg) and lowest in NM3 (P7.72-8.53/kg). In addition, net income was highest in NM3 and lowest in FP (both seasons) and NM (WS). NM2 and NM3 used a combination of soil-applied fertilizers – single elements or combination (nitrogen, P_2O_5, K_2O, S_2O_4, zinc) – and foliar-applied fertilizers – single or combination elements (calcium, copper, magnesium, manganese, zinc, sulfur, boron, iron, molybdenum). Other related products applied include growth promoters such as microorganisms, biostimulants, fulvic acid, humic acid, organic matter, vitamin B complex, among others. The application rates and times were variable depending on the location.

Keywords: Balanced nutrition, nutrient management, biostimulant, biofertilizer, foliar-applied fertilizer

Adapting to water scarcity: Enhancing water productivity in aerobic rice cultivation through drip irrigation

Dindo King M. Donayre[1], Alaissa T. Remocal[1], May-Ann F. Galapon[1], Ricardo F. Orge[2], and Kristine C. Samoy-Pascual[2]

[1]Crop Protection Division, [2]Rice Engineering and Mechanization Division, DA-PhilRice CES

Drip irrigation has been successfully demonstrated in high-value crops, but not in rice due to high costs. There is a dearth of knowledge on this technology in the Philippines. Two sets of experiments were conducted at the PhilRice experimental farm from 2020 to 2021 dry and wet seasons. Experiment I, arranged in randomized complete block design with 3 replications, consisted of 3 different lateral spacings (40, 60, and 80–cm), with surface flooding (SF) as the control treatment. It investigated the influence of varying lateral dripline spacings on the grain yield, water productivity, and economic returns of aerobic rice. Experiment II, also arranged in ECBD, consisted of four treatments [T1- unweeded, T2- pretilachlor followed by (*fb*) 2 hand weeding (HW), T3- bispyribac-sodium *fb* 2 HW, and T4- T2 + T3 *fb* 6 HW]. It determined the impact of herbicide and manual weeding on the weed flora, yield, and net income of drip-irrigated aerobic rice. In each experiment, a drip irrigation system was set up using a 20–mm PVC pipe as the mainline and sub-mainline to supply water to PE lateral lines. Results from Experiment I demonstrated that the 60–cm lateral spacing consistently yielded the greatest irrigation water productivity up to 1.03 kg m^{-3} and a significant reduction of 42% in terms of water usage as compared to SF. It also generated the most significant average profit margin, surpassing the other drip treatments by 41–75%, and showed similar economic returns when compared to SF. In Experiment II, results showed that T4 successfully inhibited weed growth completely and led to higher grain yields and net income. The research findings underscore the potential benefits of drip irrigation in aerobic rice cultivation with comparable yields to SF while reducing irrigation input, enhancing water productivity, and preventing yield loss due to weeds.

Keywords: drought, water scarcity, water-use efficiency, sustainable agriculture

The pursuit on ecology and management of *Cyperus rotundus* L. infesting rice under flooded conditions

Dindo King M. Donayre

Crop Protection Division, DA-PhilRice CES

Cyperus rotundus is a weed of rice that can adapt in both drought and flooded conditions. Its ecology and management have long been known in cultivated rice in upland conditions. In flooded conditions, however, this matter is not well-explored. Ecological and weed control experiments were conducted at PhilRice-CES from January 2018 to December 2022 to determine the growth and management of *C. rotundus* under flooded conditions. Each experiment used appropriate design, data gathering, and data analysis. Crop-weed competition experiments showed that *C. rotundus* reduced yields by as much as 28% for wet direct-seeded rice (WDSR) and 38% for transplanted (TPR). To prevent more than 5% grain yield reduction, the classical and statistical models suggested that the weed must be controlled from 18 to 26 DAS in WDSR; 14 to 29 DAT in TPR. All of its tubers planted at 0 (soil surface), 5, and 10cm soil depths had 100% germination when not flooded; 20 to 50% when flooded by 3 to 5 cm water depths and planted at 0cm soil depth; and 0% when flooded by 3 to 5 cm water depths and planted at 5 and 10cm soil depths. The tubers, however, had 100% germination even when shredded by up to 4x under saturated conditions; 85 to 90% even when buried and flooded for 90, 180, 270, and 360 days. Weed control experiments showed that no specific rice variety nor nitrogen rate can suppress the growth of *C. rotundus*. The weed, however, can be suppressed by increasing crop density, i.e., 60 to 240 kg ha^{-1} seeding rate, particularly for WDSR; early flooding (7 DAS and onwards); and herbicide application (bispyribac-sodium, 2,4-D, and MCPA). The findings of the experiments were considered in developing an integrated weed management strategy against *C. rotundus* infesting rice under flooded conditions.

Keywords: CYPRO, invasive pest, weed adaptation, weed control

Identification of combined tungro virus and blast-resistant Philippine traditional rice varieties using KASP SNP markers

Daphnie B. Abonitalla[1,2], Rosa Mia F. Cabanting[1], Juan Rodrigo C. Vera Cruz[1,2,3], Patricia Izabelle Lopez[1], Ivy Jane Madrid-Savariz[1], Mark Ian C. Calayugan[1], and Teresita H. Borromeo[1]

[1]UP Los Baños; [2]DA-PhilRice Los Baños; [3]DOST-Science Education Institute

Rice diseases such as blast and tungro greatly reduce rice yields. Use of resistant varieties remains the most efficient, cost-effective, and sustainable method in disease management. TRVs offer potential novel gene(s) that can be used for the development of resistant varieties. Identification of TRVs with favorable allele(s) is an essential part of marker- assisted selection (MAS). Kompetitive Allele-Specific PCR (KASP) genotyping assay using single nucleotide polymorphisms (SNPs) is among the fastest, cost-effective, and most accurate methods to detect the presence of favorable alleles used for MAS breeding program. In this study, 178 TRVs were evaluated using eight trait-based SNP markers with 5 major blast-resistant genes (*qPi33, Pi9, Pik, Pi54,* and *Pita)* and 3 major tungro-resistant genes (*TSV1*, *TBV1,* and *STV11*). It was found that favorable alleles for 6 out of the 8 SNP markers were present in this group of TRVs. For blast resistance, the frequency of favorable alleles ranged from 22.47 to 29.21%. Meanwhile, for *tungro*, the frequency of favorable alleles ranged from 0.56 to 38.21%. Some of these TRVs are Balatinao Diket (1), Balatinao Diket (2), and Balatinao. SNP markers for tungro-resistant genes such as *TSV1*, *TBV1*, and *STV11* have 1, 20, and 68 TRVs favorable alleles, respectively. Some TRVs with known multiple favorable alleles are Balatinao, Nagsalay, and Pilit. Overall, this study provides valuable insights regarding the genotypic background of the selected TRVs, which may have potential use in the development of modern rice varieties adapted to climate change and disease outbreaks.

Keywords: KASP, MAS Breeding, blast-resistant gene, tungro-resistant gene, SNPs

CONCURRENT SESSION 2.
FARM CLUSTERING AND CONSOLIDATION

Development of RiceBIS Community in Masbate through Clustering Approach

Melanie Aileen C. De Peralta, Elenor C. Sadang, Aileen R. Rivera, Irish S. Meñolas, Christian A. Barcelon, and Victoria C. Lapitan

DA-PhilRice Bicol

The Rice Business Innovations System (RiceBIS) Community Program expanded its range to help transform rice and rice-based farming communities into inclusive, competitive, and sustainable agroenterprise models. Masbate was identified as one of the sites because it is one of the low-yielding provinces in the region. Milagros and Mandaon towns, its largest rice producers, were the Phase II and expansion sites, respectively. Nine clusters with 502 members in Phase II site and 885 members in expansion site were formed. In 2020 to 2022, 180 farmers (104 men, 76 women) were trained in a modified farmers' field school covering both rice production training and organization-building and management with 60.5% gain-in-knowledge (GIK). Additionally, 94 farmers were trained in agroenterprise development with average GIK of 21.3%. These trainings strengthened their capacity in crop production, organizational management, and agroenterprise development. Pigmented rice (red/black glutinous rice) was the identified cluster enterprise that has high market potential. Through several interventions, an average yield increase of 0.24 t/ha (2.12 to 2.36 t/ha in wet season) and 0.79 t/ha (1.63 to 2.42 t/ha in dry season) in Milagros and 0.51 t/ha (2.10 to 2.61 t/ha, WS) and 0.57 t/ha (1.21 to 1.78 t/ha, DS) in Mandaon were attained. Clustered farmers were able to access more services such as machinery grants and other government services beneficial in both rice production and enterprise development, such as pre-registration seminar for CDA registration, linkage with DTI for product improvement, promotion through agri-fairs, application of loans through credit institutions, and repair of dams thru LGU. Although yield was relatively low despite the observed increase, farmers continuously produce and engage in their chosen agroenterprise. Product quality improvement, stable supply and linkage to market should be given focus to ensure the sustainability of cluster enterprise.

Keywords: clustering, agroenterprise, production, enterprise

Roll-Over Scheme: Building Capital for a Working Farmers' Association

Andres L. Dela Cruz Jr., Richelle G. Villanueva, Redentor B. Loñez, Jayson L. Agustin, and Sunshine V. Palacol

DA-PhilRice Isabela

Farmers' cooperatives and associations (FCAs) are now becoming important stakeholders of various government programs. They serve as conduits in the delivery of agricultural services like in the RCEF programs. However, most of them cannot survive because of various reasons, one of which is unavailability of start-up funds for their operations. To partially address this, the RCEF Seed Program introduced the seed roll-over scheme to its partner FCAs. One of the recipients is Alfonso Lista town, the largest rice area (2,300ha) in Ifugao with the biggest average allocation of 3,000 bags of seeds per season. They have very active FCAs that support government programs, but lack funds to sustain their operations. The scheme maximizes the gains out of the RCEF seeds. A seed-exchange system was set up in the FCAs where members can exchange seeds from their harvest equivalentim to their seed allocations from the program. The exchanged seeds are consolidated by the FCAs and converted into cash as share capital of each contributing member. The scheme continues every season. From DS 2020 until 2023 DS, 53 FCAs have adopted it with 4,900 bags of RCEF seeds rolled over amounting to ₱1,107,728.00. Of these FCAs, Namillangan-Calupaan Lateral FIA Association now has ₱308,170 total collection which enabled it to operate and grow. It now has various agri-entrepreneurial activities such as custom-hiring of farm equipment granted by the RCEF mechanization program, farm input- selling and credit. The funds they continue to generate from the roll-over scheme have helped them improve their yield because of enhanced access to farm inputs, particularly fertilizer and pesticides. The strengthened FCA is now a strong partner of PhilRice Isabela especially in the *Binhi e-Padala* seed distribution.

Keywords:

Transforming rice-based farms into farm enterprises:
A community-based development project in Ilocos Norte

Mark Ariel L. Agresor, Reinamae G. Banquirig, Vanessa Joy B. Marquez, Melinda G. Calumpit, Sheryl U. Buquing, and Elizard D. Oamil

DA-Regional Field Office I

Low income due to unstable market prices of products and high production costs, combined with low yield due to lack of technical know-how on latest technologies, are the gaps in farming identified through Participatory Rural Appraisal (PRA) in Ilocos Norte. Through Community-based Participatory Action Research (CPAR), the DA-RFO 1 designed and implemented an integrated production management system in collaboration with rice-based farming communities and the Local Government Units (LGU) of Dingras and Paoay. The 35 farmer-cooperators verified the technical and economic feasibility of matured technologies (high-yielding varieties of rice, corn, and mungbean; balanced nutrient and pesticide-use strategies; and farm waste management) in 45.66 ha, which was complemented with capability-building activities, particularly in the application of effective total farm productivity for sustainable production. As a result, productivity increased significantly in the rice-rice-mungbean (RRM) cropping system with 12-42%, and rice-white corn with 13-101% through improved technologies, particularly balanced fertilizer and pesticide-use strategies. A high net income of ₱61,401.89 from RRM was also realized. Product consolidation and farm enterprises also increased income in the pilot sites. The level of knowledge of farmers and their association was enhanced by 51% and increased their adaptive capacity to 100% through capability-building activities and active participation in the overall management of the farm. The integration of production to marketing services empowered the communities to cluster and consolidate their farm products, resulting in the development of three vibrant enterprises that directly benefited 190 farmers, two institutional buyers, four National Government Agencies, six LGUs, and seven farmers' cooperatives and associations (FCA). With the project's results, lessons learned, and recommendations, it is suggested to scale up and expand the project, institutionalize rice and rice-based research, farm clustering and consolidation approach, strengthen research centers to produce high-quality seeds; prepare policy recommendations to LGUs to adopt 1) Balanced fertilizer and pesticide-use strategy, 2) Use of rapid bioassay pesticide residue analysis; 3) Clustered and consolidated production to marketing; and 4) continuously improved production support services to FCAs to sustainably produce high-quality seeds of mungbean, and to develop more enterprises to enrich farmers' income.

Keywords: Participatory Rural Appraisal, improved technologies, community-based assessment

Effects of redrying methods on the milling potential, crude protein and total phenolic contents, and antioxidant activity of stored inorganic and organically grown paddy

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This study determined the effects of redrying techniques (no redrying or Control, 2-, 4-, and 6-hour redrying with stirring every 30 minutes, Farmer's Practice or 6-hour redrying with one stirring) on grain quality of stored inorganic and organic rice; and the redrying method that gives best-quality rice. PSB Rc 82 rice harvested in October 2016 was used in the February 2017 experiment. Quality parameters evaluated were: moisture content, brown rice, total milled rice, and crude protein content in percent. Total phenolic content and 2-2 diphenyl-1-picrylhydrazyl (DPPH) radical-scavenging activity were also determined. Moisture content (9.80–11.55 %MCw.b), brown rice (70.19%–72.52%), total milled rice (66.37%–69.12%), crude protein content (6.60%–7.73%), total phenolic content (0.0783–0.0950 mg g^{-1} GAE), and % DPPH (19.53–26.87) of PSB Rc 82 rice were all significantly influenced by redrying process and type of rice (p=0.05). Due to shorter exposure to high temperatures, 2-hour redrying produced maximum brown and milled rice recoveries while removing least amount of moisture from paddy samples. PSB Rc 82 paddy exposed to various redrying techniques had 9.10–11.60% MCw.b. No redrying had highest crude protein content. Inorganic rice had more crude protein than organic rice. Amount of crude protein determines how nutrient-dense rice is. Samples dried at 4-hour redrying with 30-minute stirring intervals produced the highest %DPPH, which was also higher in inorganic than in organic rice. The larger the percentage of DPPH radical- scavenging activity and total phenolic contents, the better and more advantageous rice is to human health.

Keywords: antioxidant activity, crude protein content, milling potential, redrying, total phenolic content

Malusog Rice integration in the MASAGANA Rice Industry Development Program: A catalyst for food and nutrition security in Regions 5 and 8

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Integrating Malusog Rice in the Masagana Rice Industry Development Program (MRIDP) supports the Department of Agriculture's agenda in ensuring a food and nutrition-secure country. This biofortified rice with enhanced vitamin A content addresses Vitamin A Deficiency, particularly in target areas of Regions 5 and 8. In establishing Malusog Rice fields, the farm-clustering approach was employed. Respectively, 24 and 40 ha were planted since November 2022. Beyond promoting the cultivation of Malusog Rice, the approach succeeded in providing access to services. The Batang Farmers Assocuation in Ligao City, Albay received free seeds, technical assistance, and fertilizer vouchers from DA-RFOs and LGUs, which enhanced their capacity to maintain a nutritious and sustainable crop. Furthermore, the integration underscored the significance of partnerships developed with both old and new stakeholders– Local Government Unit of Ligao City and Calbiga, Provincial Social Welfare and Development of Catanduanes, and National Food Authority Region 5. These collaborations were anchored on agreements for the buyback of Malusog Rice, which were utilized in nutrition programs and disaster risk relief operations. Such forward-thinking partnerships not only stimulated agricultural productivity but also contributed to the well-being of communities in need.

Keywords: integration, clustering, Malusog Rice, vitamin A deficiency

Brown Rice market segmentation: The case of Metro Manila

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Brown Rice is an alternative to white rice in the Filipino diet, which brings about nutritional and societal benefits. Despite its advantages, Brown Rice commercialization and consumption still remain a challenge. Hence, this study determined consumer market segments, factors affecting consumers, and policies/interventions that can help increase Brown Rice consumption and enhance its commercialization. The study employed a mixed method approach. Data across different districts in Metro Manila revealed common demographic characteristics among Brown Rice consumers and non-consumers. Consumers predominantly purchased Brown Rice from modern and traditional markets, with the significant majority willing to do so within their regular budget. Consumption remained to be largely at home. Factors influencing the purchase and consumption of Brown Rice included availability, affordability, packaging, health considerations, and quality. Moreover, constraints in purchasing Brown Rice were high prices, unavailability, and packaging issues. Four distinct consumer segments (personas) were identified: 1) light users who are aware of brands, 2) light users who are unaware of brands, 3) health-conscious consumers, and 4) consumers with medical conditions. These segments were subdivided into those with 1) positive attitude and 2) negative attitude. The study recommends strategies that could bolster Brown Rice supply, and policies and interventions that could push up demand. To enhance supply, farm clustering among producers, disseminating information of varieties with good eating quality, investing in product packaging, and ensuring availability and accessibility are emphasized. On the demand side, facilitating institutional linkages and employing branding strategies (premium, institutional, local) are forwarded. The study likewise suggests employing push and pull marketing strategies to elevate consumer awareness and boost loyalty toward acceptability of Brown Rice in the market.

Keywords: *Brown Rice, market segmentation, consumer and non-consumer profiles*

Increasing crop productivity and income in rice-based water-scarce environments using a mechanized dry-seeding technology

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Dry direct-seeding of rice is widely practiced in drought-prone areas during the wet season, but some farmers are also adopting it in the dry season. Farmers resort to manual sowing because options for mechanical seeding are not available. In this project, a multi-purpose seeder (MPS) attached to the popular hand tractor has been developed for dry seeding of rice, maize, and mungbean. MPS has a moldboard-type furrow opener, an inclined circular seed plate for seed metering, and furrow closer that covers the seeds. The adaptive trials relative to crop establishment, seeding and fertilizer rates, and suitable varieties in comparison with farmers' practices were conducted in 19 provinces within eight regions. The recommended seeding rates are 60 kg ha^{-1} for rice, 22 kg ha^{-1} for maize, and 20 kg ha^{-1} for mungbean, with an effective theoretical field capacity of 2.5 ha d^{-1}. The introduction of Best Management Practices (BMP) as integrated into mechanized (MPS) crop establishment in the water-scarce irrigated lowlands was proven to reduce the production cost of the three crops by 20-30%. This translated to 20-30% bigger net income of farmers, increased crop productivity per unit area by establishing subsequent crops after rice with MP Seeder, and ensuring crop establishment even if monsoon rains are delayed. MPS will create business opportunities for farmer organizations, service providers, and local manufacturers of agricultural machinery. The MP Seeder is now commercialized and has five licensed manufacturers in Luzon and Mindanao.

Keywords: Multi-purpose seeder, dry seeding, rice, corn, mungbean, water-scarce environment

Optimizing Hybrid Rice Seed Yield and Income in AxR Seed Production of PSB Rc72H through Mechanized Establishment

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Use of hybrid rice technology is identified to increase production. Increasing the yield while decreasing the cost of production is the most feasible solution to make rice farming competitive and profitable. Seed growers must be offered with alternative technologies such as mechanized transplanting and reduced seeding rate that will lower the cost of production and increase seed yield in hybrid seed production. The problem of low yield of hybrid seed production needs to be addressed as well as its high cost. Hence, this study on mechanizing the transplanting of AxR seed production of PSB Rc72H and determining the appropriate seeding rate of A-line was conducted. Trials were established at PhilRice Isabela from 2021 dry season to 2022 wet season. Seeding rates of A-line were 10, 13, and 15kg/ha and established using the 4-row walk-behind transplanter. These were compared with the conventional seeding rate of 15kg/ha transplanted manually. Results showed that as the seeding rate was reduced, the number of seedlings that emerged from the trays decreased proportionately. However, this was not significantly different among the seeding rates when transplanted in the field. This implies that even with reduced seeding rate of 10kg/ha, the needed seedlings per hectare is sufficient using the mechanical transplanter. Furthermore, A-line seed yield did not differ among the three seeding rates. In terms of cost of production, the lowest was obtained from using 10kg A-line/ha seeding rate applied with 134-42-102 kg NPK/ha, 6 bags 14-14-14 at 5 DAT of R and A-lines, 2 bags 46-0-0 at 20 DAT of A-line, and 2 bags of 46-0-0 + 2 bags of 0-0-60 at 30 DAT of A-line. Establishment cost for mechanical transplanter was about ₱7,500.00/ha while manual establishment (pulling and transplanting) amounted to ₱13,500.00/ha.

Keywords: mechanical transplanter, hybrid rice seed production, yield

CONCURRENT SESSION 3. FARMER-ENTREPRENEURS IN THE RICE VALUE CHAIN

2022 costs and returns of palay production in the Philippines

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The Survey on Costs and Returns (SCR) of Palay Production generates data on its cost structure and average use of materials and labor inputs, measures of profitability, and other socio-economic characteristics of palay farming in the country. They also serve as benchmark data which are needed in the annual updating of the database. These data had been gaining more attention because of their varied uses and applications for the policy analysts, national accounts compilers, farmers, and other entrepreneurs in the agriculture sector. For palay farmers, these data can serve as the basis for their planning and programming activities. They can use these data in selecting the most profitable set of crops to plant during a particular season. For both government and private planners and policymakers, these data can be used in designing appropriate programs and projects to boost the growth and development of the palay industry. The 2022 SCR of Palay Production was conducted by the Philippine Statistics Authority, with funding support from the DA-Bureau of Agricultural Research. This paper will present the key findings on the production cost structure of palay as well as a summary of indicators on measures of profitability covering the country's 16 regions.

Keywords: SCR, Palay, Cost of Production, Costs and Returns, CoP

Understanding current issues in the Philippine rice sector: Policy options to protect farmers' and consumers' welfares

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High rice prices and possible rice shortage are among the pressing national concerns as rice is a fundamental part of the diet and source of livelihood of many Filipinos. This analysis explains the causes of spiraling rice prices, determines the sufficiency of domestic rice supply, and offers policy options to help farmers and consumers manage these issues. Climatic challenges and global issues triggered the recent spike in local rice prices. Rice for global trade declined as India restricted its rice exports to secure its domestic supply and tame rice prices amid unfavorable weather. Demand for Vietnam and Thai rice shot up as importing countries turned to them instead. Some countries also increased their rice imports to compensate for lower production due to bad weather, and others turned to rice as a substitute given the expensive maize and wheat brought about by the Russia-Ukraine War. This global rice supply-demand scenario led to higher Vietnam and Thai rice export prices, which translated to higher prices in the Philippines as it sources roughly 90% of its rice imports from Vietnam. Despite India's rice export control and production risks due to El Niño, the Philippines projects enough rice supply until 2025. To realize this, early provision of production support for the 2024 dry season cropping must be intensified so that farmers can avoid crop losses due to drought. Rice prices must be regularly monitored, additional procurement fund for NFA to augment its buffer stock must be provided, and lower rice import tariff may be considered during lean months in 2024 to prevent extremely high rice prices and low farmgate prices. Implementation of social safety nets must be intensified to protect poor consumers from expensive rice. The public is also encouraged to consume rice responsibly and explore rice substitutes to avoid wastage and dampen the pressure on supply.

Keywords: supply, demand, prices, global rice trade, climatic challenges, El Niño

Clustering approach toward agroenterprise development: The RiceBIS 1.0 experience in Regions 2 and CAR

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DA-PhilRice Isabela

Individual smallholder farmers lack economies of scale to reach the big market and gain more from their farming activities, thus, the need to organize them into production clusters. This paper presents the experiences of three Rice Business Innovations System (RiceBIS) 1.0 communities in Regions 2 and Cordillera using the clustering approach in agroenterprise development. RiceBIS 1.0 aimed to: (1) establish partnerships for production and agroenterprise development; (2) enhance farmers' capacity on production, organization-building and management, and agripreneurship; (3) increase yield by 1t/ha and reduce cost of production by 30% and post-harvest losses to 12%; and (4) engage farmers in profitable rice-based enterprises along the value chain. In Phase 1, a RiceBIS community was composed of production clusters with 10-15 individual farmers while in Phase 2, the clusters were organizations with at least 50 members. Each community covered 100 to 400ha. After five years of implementation, the RiceBIS community in San Mateo, Isabela was registered into a cooperative with 109 active members covering 124ha. Farmers' yields increased from 5.88 to 7.30 t/ha and production cost was reduced from ₱10.86 to ₱8.80/kg of fresh palay achieving an increased income of ₱43,618.66/ha. The community in Diffun, Quirino with 10 clusters involved 415 farmers covering 460.98ha. Yields increased from 4.93 to 5.66 t/ha and cost was reduced from ₱10.78 to ₱9.37/kg, increasing income to ₱27,502.37/ha. Alfonso Lista, Ifugao had 10 clusters of 412 farmers covering 405.12ha. Yields grew from 3.49 to 4.16 t/ha; cost fell from ₱16.47 to ₱10.91/kg; income was ₱16,166.37/ha. All communities generated initial capital to operate their milled rice business, agro inputs trading, and custom service provision of farm machines. This implies that organized farmer-clusters can make their rice-farming activities more profitable and if properly guided, they can as well establish, manage, and sustain their own agroenterprises.

Keywords: clustering approach, agroenterprise development, organization-building and management

Empowering farmers through agripreneurship:
The case of Batitang Agriculture Cooperative in RiceBIS Zaragoza, Nueva Ecija

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The government and the private sector recognize agripreneurship as a game-changing strategy to improve the income of farmers by engaging them in value-adding activities and making them competitive as the global rice food economy becomes more integrated. Inspired by these benefits, the Rice Business Innovations System (RiceBIS) Zaragoza project established a partnership with the Batitang Agricultural Cooperative in 2021. The project employed several development strategies to empower the farmers and attain the respective outcomes. They were capacitated on: a modified PalayCheck System to boost their rice productivity; *Gulayan sa Palayan* to strengthen crop diversification and ensure cash income; and agripreneurship to build their business skills toward bigger opportunities. To ease their access to the market, they were linked with an established rice miller and institutional buyer for collective marketing of palay and vegetables, respectively. The PalayCheck training pulled up farmers' yield by 1.6 tons/ha. The collective marketing activity strengthened the members' bargaining power, which enabled them to negotiate a rice price advantage of ₱0.91 and ₱1.41 per kg in 2021 and 2022, respectively. This raised their income to around ₱5,000/ha/season. They also received higher prices from the consolidated vegetables sold to institutional buyers, which provided them a regular cash income from selling twice a week. The RCEF farm machines empowered the group to engage in custom hiring that led to ₱188,814 additional income/year. They were registered with the Cooperative Development Authority, which transformed them from a farmers' association into an agricultural coop that can legally engage in agroenterprises and access support from government programs. These strategies along with strong enabling support from government and private institutions can be a game-changer for rural development and improved welfare of small farmers.

Keywords: RiceBIS community, agripreneurship, value-adding activities, farmers' cooperative

Rice value chain analysis in Western Visayas:
Structure, value addition, constraints and strategies

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The value chain analysis (VCA) framework was used in the study to analyze the rice value chain (RVC) in Western Visayas, examine the value additions, identify constraints, and propose strategies and interventions. VCA is essential in the understanding of markets, their interactions, the involvement of various players, and the critical constraints that limit the growth of rice production and consequently the competitiveness of smallholder farmers. Primary data were derived from key informant interviews in government and private agencies, surveys among farmers, paddy traders, millers, wholesalers, wholesaler-retailers, and retailers in six rice-producing provinces and demand centers. The data were analyzed using descriptive and economic approaches. The RVC starts with the provision of inputs to produce paddy, and ends with the consumption of milled rice. Farmers could earn, on average, ₱12,500/ha or a net profit of ₱3.89/kg by cultivating paddy. The RVC is dominated by a traditional multi-layered supply chain with interconnected chain actors composed of competing farmers, paddy traders, millers, and rice traders in each segment. Also engaged are agents in both paddy aggregation and rice distribution, thus, increasing marketing cost. The net profit on paddy trading was ₱2.23/kg, rice milling ₱9.48/kg, wholesaling ₱1.81/kg, and retailing ₱2.94/kg. On average, disintegrating the margin shares at a retail price of milled rice (₱42.67/kg), the farmers' share was approximately 35%, paddy traders 12%, rice millers 39%, wholesaler 5%, and retailer 9%. The high share of the rice miller was attributed to additional value of by-products. Though farmers gained high profit and net profit-cost ratio, they produced paddy at an average of 8 tons/year/farmer. The profit or income of farmers can only be earned in a 4-month cropping season. For paddy traders, the margin is low but they profit from large volumes of paddy traded. Rice millers have the highest unit margin because of more frequent volume turnover. Likewise, there was higher profit in retail than in wholesale but wholesalers still get higher returns owing to business volume and turnover. The major constraints identified in the RVC included high production and marketing costs of paddy and rice attributed to low yield, high labor cost and material inputs, and insufficient market facilities, which resulted in high price of rice. To raise the level of competitiveness, the rice industry should focus on generating and promoting technologies that increase yield, reduce production and postharvest losses, and minimize costs. Moreover, investments in infrastructure and facilities for transport, handling, storage, drying, and milling should be given equal attention.

Keywords: rice value chain, structure, value addition, constraints, strategies

To what extent is the NSIC Rc160 a success story?

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DA-PhilRice CES

This study inquired on the extent of success of NSIC Rc160, a PhilRice-bred variety. Rc160 is known for its excellent eating quality and its popularity across the Philippines. The study employs innovation mapping in pursuing the inquiry. Stakeholders were invited and the initial findings using the innovation mapping tool was expanded upon through key informant interviews and focus group discussions in nine provinces: Nueva Ecija, Pangasinan, Tarlac, Bulacan, Samar, Leyte, Davao del Sur, Agusan del Sur, and Surigao del Sur, through criterion, snowball, and purposive sampling. The study finds that the variety was indeed successful in terms of how it spread across the country and the level of acceptance by various stakeholders. The extent of its success, however, is stifled by the weaknesses in the innovations system brought about by the competing and conflicting goals of its actors. The study brings insights on these conflicts in the innovations system that if resolved could benefit the future innovations that will be supported by this same innovation system.

Keywords:

CONCURRENT SESSION 4. DIGITAL TRANSFORMATION

RiceLytics: Enabling data-driven decision-making in the rice sector

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Understanding the whole story of the rice sector at the national, regional, and provincial levels can be an arduous task for policy and decision-makers. With the advances in information technology, this process can be automated. Thus, the RiceLytics online dashboard was developed. In its website, users are presented with three dashboards that narrate the status of the rice industry, the profile of the rice farmers, and the rice farming practices. In the rice industry dashboard, information about palay production, area harvested, estimated profit, rice consumption, rice supply allocations, and palay and rice prices are meticulously organized. The farmer profile dashboard describes the rice farmer's demographics, estimated income, land ownership, organizational membership, and training participation. The rice farming practices dashboard presents the rates of inputs, types of seeds, farming machines, and establishment methods. These dashboards are arranged from national, regional, down to the provincial level. Various visualization methods were employed such as charts, graphs, maps, and data cards. At the backend of the platform is the data warehouse where data stewards compile and update the Key Performance Indicator (KPI) data from various sources such as the Philippine Statistics Authority, PhilRice's Socioeconomics Division and Philippine Rice Information System, DA-Fertilizer and Pesticide Authority, and other information sources.

Keywords: Data Analytics, Decision-support, Data-driven

PalayCheck App: An integrated rice farm management smartphone application tool

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The PalayCheck System is a knowledge platform for rice farming technologies and practices. As new knowledge and technologies are generated and developed, the platform evolves and grows in content. To make the platform more interactive and immersive, the PalayCheck App was developed. It is a smartphone app tool that has three main functions – rice crop and management advisory, crop season planning, and record keeping of farm activities and expenses. The advisory feature provides farmers with daily updates on the rice crop growth stage and the corresponding concerns that may affect its growth such as pests, nutrients, and water. Recommended practices and technologies per crop management activity are also presented. The planning feature allows them to create a cropping calendar based on the variety that they intend to use, their chosen establishment method, and their preferred nutrient management option. Throughout the cropping season, they can record the actual farming activities, expenses, and harvest data. At the end of the season, a summary and estimated net income are provided.

Keywords: Smartphone App, digital agriculture, PalayCheck System, PalayCheck App, smartphone

D4AgPH: Bridging Gaps and Unlocking Opportunities

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The digital transformation of Philippine agriculture has made significant progress, driven by technological advancements and growing recognition of its potential to address sectoral challenges. The "MASAGANA Rice Industry Development Program 2023-2028" recognizes digital transformation as a key strategy to achieve a stable rice supply, high farm productivity, and increased income for rice farmers. By embracing precision farming and data-driven decision-making, farming communities can enhance productivity, resource management, and sustainability. Additionally, extension agents can provide more accurate recommendations and disseminate best practices effectively, while researchers can access comprehensive datasets for real-time monitoring, data collection, and analysis. However, there is a lack of centralized information and coordination regarding the development and availability of digital agriculture tools and services (DATS), which hinders effective access and adoption by farmers and other stakeholders. To address this challenge, the project "Assessment of digital tools for data-driven decision making on rice-based agri-food systems in the Philippines" was recently initiated by the Department of Agriculture Rice Industry Development Program (DA-RID), in consultation with the Philippine Rice Research Institute (PhilRice), the Agriculture Training Institute (DA-ATI), the Information Communication and Technology Services (DA-ICTS), and the International Rice Research Institute (IRRI), with funding from the Bureau of Agricultural Research (DA-BAR). The project aims to co-design and develop an online platform, called D4AgPH, which will serve as a comprehensive searchable database of DATS. D4AgPH will provide detailed information on each DATS, its functionalities, and benefits to facilitate informed decision-making. Moreover, the platform is open to the public, aiming to stimulate widespread adoption of DATS. It also includes descriptive analytics to provide insights into the level of digitalization of the agri-food value chain, identifying gaps and opportunities. The D4AgPH database currently hosts 89 DATS out of 204 scoped from various on- and off-line sources. The preliminary investigation shows that the majority of the DATS are designed to support activities in the crop sector specifically in the input and production component of the agri-food value chain. Moreover, a small percentage is dedicated to consolidation, processing, and consumption. These proportions will change as more DATS are added to the database, providing a solid foundation for further analysis and insights.

Keywords:

Outscaling of soil fertility mapping and map utilization on irrigated rice areas of Allacapan, Cagayan

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DA-Regional Field Office 2

Soil analysis is crucial in optimizing crop production, as it determines the availability of essential nutrients required for crop growth. There is a need, therefore, to focus on the outscaling of soil fertility mapping and its practical application in irrigated rice areas of Region 2. This research aimed to enhance rice production efficiency and economic sustainability through the utilization of Soil Fertility Maps (SFMs) developed by the DA-RFO 2-Regional Soil Laboratory using ArcGIS. The impact of SFMs on crop yield and growth performance was compared with traditional farmer practices using the paired t-test method. The experiments were conducted over two cropping seasons (2021-2022) in Bulo and Matucay Farmers' Cooperative and Associations (FCAs) of Allacapan, Cagayan using NSIC Rc404H (LongPing 2096). Results showed that using SFMs significantly improved the various agronomic parameters by 1.70-9.09% and yield outcomes of 22.77% compared with conventional farmer practices. Notably, SFM-guided cultivation had 9.06% taller plants at maturity, 6.71% increase in 1000 grain weight, 22.77% higher yield per hectare, and consequently gave 44.81% higher return on investments compared to traditional farmer practices. Overall, the results highlight the value of SFM to the 31 farmers with about 50 ha at the study areas as a useful and cost-effective tool for farmers to optimize gains from rice production. Therefore, use of SFMs is highly recommended to improve the sustainability and profitability of rice cultivation in the region.

Keywords: *Soil Fertility Maps, Return on Investment, soil health, ArcGIS, nutrient management*

Influence of Rice Crop Manager (RCM) recommendations on yield of rice in saline and zinc-deficient areas of Region 2

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DA-Regional Field Office 2

Inappropriate application and high price of fertilizers are just two of the current problems in achieving higher yield in rice farming. Hence, an appropriate nutrient management tool such as the Rice Crop Manager (RCM) app must be utilized to address the said issues. This study was conducted 2020 dry season to 2023 DS to determine the influence of RCM app recommendations on yield of rice in the saline and zinc-deficient areas of Aparri, Buguey, and Iguig, Cagayan; Cabatuan, Isabela; Aglipay, Quirino; and Solano and Bayombong, Nueva Vizcaya. Three treatments were tested (modified RCM or the rate adjustments of the application of $ZnSO_4$ and original RCM recommendations as well as farmers' practices). Data on yield, agronomic parameters, and salinity levels were gathered and subjected to ANOVA; production cost via the cost and return analysis. In the dry season, the original RCM recommendations significantly increased yield by 0.6 to 1.1 t/ha with ROI of 161% and 63% under less and high intrusion of salt water, respectively. In zinc-deficient areas, a significant increase in yield by 0.8 t/ha was seen using the modified RCM with ROI of 114% and 183% during the wet and dry seasons, respectively. The original RCM recommendations significantly pulled up yield by 0.68 t/ha and 0.56 t/ha with ROI of 112% and 172% in both seasons. The RCM app recommendations truly influenced the yield of rice in saline and suspected zinc-deficient areas in Region 2. The app, therefore, is highly recommended to further improve the productivity and profitability of rice farming in the region.

Keywords: Current and Modified RCM Recommendations, Problem soil (Saline-prone rice areas), Suspected zinc deficiency, Research Themes (different rice-growing areas)

Enhancing rice yield in the diverse rice-growing areas of Region 6 using the Rice Crop Manager (RCM)

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The Rice Crop Manager (RCM) is a comprehensive decision support tool for raising yield and income of rice farmers in the Philippines. Additional research is required to further enhance RCM recommendations focused on diverse rice-growing environments. This study was conducted from the 2020 wet season to 2023 dry season to validate and improve the site-specific nutrient management component of RCM across rice-growing areas of Western Visayas (along with other best crop management components such as weed control, variety, zinc deficiency management, and high-fertility soil). Results showed that the RCM target yields (based on existing RCM nutrient recommendations for standard fertility) were achieved under farmers' field conditions, particularly during the wet seasons. In zinc-deficient areas, rice yields under existing RCM recommendations were comparable to farmer practices, as well as the crop management components on quality seed and hybrid rice. Yields under enhanced RCM with 2 kg ZnSO4 per 40 kg seed were comparable to existing RCM with 1 kg ZnSO4 per 40 kg seeds. Furthermore, grain yields under enhanced RCM using quality seeds and seed rate of the same variety with farmer's seed are comparable to existing RCM using farmer's seed and seed rate. For weed management, enhanced RCM grain yields were considerably higher than existing RCM following farmer weed control procedures. Also, grain yields in the enhanced RCM nutrient recommended for high fertility were equivalent to the existing RCM nutrient recommendation but significantly higher than the adjusted RCM recommendation for high fertility. The cost per kilogram of rice produced under existing RCM was lower compared to farmer practice. Similarly, enhanced RCM costs less per kilogram of rice produced than the existing RCM.

Keywords: Fertilizer Recommendation, Digital tool, Digital Transformation

Pest Risk Identification and Management – Digitalization of the rice pest surveillance system in the Philippines*

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Emergence and reemergence of rice pests, changes in production situation, and the deployment of new technologies indicate the need to sustain pest surveillance. The DA, IRRI, PhilRice, and BPI teamed up to develop and operationalize the ICT-based pest surveillance system called Pest Risk Identification and Management (PRIME). Through partnerships with DA-Regional Crop Protection Centers (RCPC) and local government units, about 3,000 rice fields nationwide have been monitored at monthly intervals since 2018. Using a standard protocol, trained regional partners and LGU personnel assess and collect georeferenced data on the intensity of pest injuries and pest populations during field visits and interview farmers to determine the current cropping and pest management practices and yields. Data are collected and submitted to a centralized server using mobile devices that are installed with PRIME Collect, an app with customized digital recording forms. An online portal, the PRIME WebApp, was developed to allow registered users to validate, summarize, visualize and download collected data. PRIME prepares pre-semester and monthly pest bulletins that summarize validated data and provide pest management recommendations on the most important pests during the cropping semester. The pre-semester bulletin is submitted to the DA one month before each semester to guide farmers in managing pests that will most likely occur in the coming planting season. In addition, automated pest alerts are sent via email to relevant government offices and regional partners as soon as data collected from the field indicate elevated pest cases to help farmers manage pests before injuries reach damaging levels. A standard protocol for rapid crop health assessment was also developed to quickly assess crop health when confirmed or potential pest risks are reported in areas not covered by monthly pest surveillance. The pest surveillance system has been providing the DA with information that serves as basis for developing policies, pest management recommendations, and interventions to avoid pest outbreaks and reduce yield losses. The system is operationalized and sustained by BPI and funded by the DA.

Keywords: PRIME, pest risk, rice, pest management, pest surveillance, digital agriculture

Profiling of pest and diseases incidence in irrigated rice areas: The PRIME data analysis

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DA-PhilRice CES

Pests contribute up 37% yield loss to rice. This study presents an extensive analysis of disease, injury, and insect population data collected monthly from more than 3,000 monitoring fields using the Pest Risk Identification and Management (PRIME) Project's pest survey protocol. Rice field rat damage incidence, percent weed cover, and number of stem borer egg per square meter were also included. Implemented nationwide, the project covered 16 regions, 53 provinces, and 194 municipalities between 2018 and 2021. Data were collected through the PRIME Collect app in a smart phone, and stored and analyzed in the cloud. Results and pest bulletins were accessed thru PRIME web app. Data were further analyzed by the Climate Smart Map (CS Map) project to produce a pest risk map. At the national level, results showed that brown spot, dead heart, leaf blast, sheath blight, and white head were top five diseases and insect pest injuries of rice. In terms of insect population, rice bug, green leafhopper, brown planthopper, and rice black bug exhibited the highest incidence. In terms of crop growth stage, the tillering to panicle initiation stages were the most vulnerable stages of rice to different pests. Through an interactive trend analysis dashboard developed by the CS Map project, a nationwide rice pest profile was developed. The dashboard provides the possible pest occurrence at the provincial level, identifies rice growth stages that will most likely be affected, and detects susceptible varieties. It also offers a descriptive trend analysis to understand the implications of nutrients, grain yields, and other abiotic factors on pest incidence.

Keywords: pest survey, pest incidence per sqm, digital tool

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Chair: Henry F. Mamucod

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ABSTRACTS OF POSTER PRESENTATIONS

THEME 1: Climate Change Adaptation

Crop diversification on sloping rice-based areas in Aglipay, Quirino

Archival B. Sabado[1], Glaizel A. Claro[1], Ronelo M. Abella Jr.[1], Daviedale B. Marquez[1], Fidelino R. Cabantac[1], Lovelyn A. Gaspar[2], Rose Mary G. Aquino[2], and Narciso A. Edillo[2]

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Soil erosion generally means the destruction of soil by the action of natural phenomena and human-made factors; sloping areas have a larger volume of soil erosion. Soil erosion is among the factors that deplete fertility in sloping areas affecting yield and income of farmers. This project aimed to showcase crop diversification in maximizing the use of land and optimizing farm productivity and income, improving the farming system, protecting against soil erosion and degradation, and providing an additional income for farmers. This project was implemented by the DA-Quirino Experiment Station in collaboration with the DA-RFO No. 2, and the Municipality of Aglipay. Three farmers showcased technologies on contour farming, planting of hedgerows, nutrient management, and agro-waste utilization from January 2021 to December 2022 in a 3.5-ha demonstration farm. NSIC Rc27 (upland rice variety), with an average yield of 2,563.50 kg/ha, was used. T-Test was used in data analysis. Contour farming and planting of hedgerows, i.e., banana, pineapple, citrus, and pigeon pea reduced soil erosion by 0.892 m^3/ha/year, i.e., from 1.715 m^3/ha/year to 0.823 m^3/ha/year. Reduction of soil erosion minimizes depletion of soil fertility, improves soil health, and decreases costs of production, thus, gives a higher income. Farmers used agro-waste for mushroom production so they could earn extra income. Profitability analysis showed an additional income of ₱27,457.00 was generated vis-à-vis Farmers' Practice. Recorded net incomed from various hedgerows were ₱3,575.00 (banana), ₱9,830.00 (pineapple), and ₱2,905.00 (mushroom production). Return on Investment are as follows: 76% from pineapple, 373% from banana, and 259% from mushroom. Crop diversification and contour farming using Rc27 are recommended in sloping areas to enhance productivity and increase income.

Keywords: sloping areas, crop diversification, Quirino Province

Growing upwards in *Palayamanan* Farm: Harnessing hydroponics in vertical gardens

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Hydroponics in vertical gardens offers a space-efficient and innovative approach to urban agriculture that could also be integrated into rice-based farming systems for modern vegetable production. In this study, we demonstrated vegetable production in a hydroponic-vertical tower garden at the *Palayamanan* farm and estimated the benefit-cost of annual lettuce production. Additionally, we determined the effects of vertical positioning within a tower garden on the growth of lettuce varieties over two growing cycles. Results showed a significant difference in plant weight between the positions of the plants along the vertical tower garden of 1.5 m. The lettuce plants at the top of the tower were significantly heavier (51-63 g) by 31-63% (p<0.05) compared to those in the middle (29-35 g) and bottom (24-31 g) positions. However, there were no significant differences in the number of leaves among the positions. The observed weight differences can be attributed to sun exposure, as plants in the middle and bottom positions experienced partial shading from those at the top during their growth. The study recommends staggering the planting schedule of lettuce from the bottom to the top of the vertical tower to maximize sunlight exposure for all plants. In terms of benefit-cost analysis, the results showed that the estimated annual income for lettuce production was ₱73,367 with a payback period of 3.19 years, a return on investment of 31%, and benefit-cost ratio of 1.24. This study clearly shows that the investment is feasible and economically viable, with an ROI and a favorable BCR while providing space-efficient, fresh, clean, and healthy produce to the local markets.

Keywords: hydroponics, lettuce, modern farming, soilless agriculture

Outscaling of rice-based farming system (rice+duck) in open source pump-irrigated areas in Ilagan and Tumauini, Isabela

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DA-Cagayan Valley Research Center

The Philippines faces food sufficiency challenges due to population growth, limited palay production brought about by climate change, and decreasing farm sizes which compel government to import rice. In rice production, the use of agro-chemicals is another challenge due to the harmful effects on the environment and higher production cost to resource-poor farmers. Sustainable development strategies to alleviate the food crisis, such as rice-fish, rice-azolla, rice-snails, and rice-duck integrated farming systems can be promoted. In 2014, a Rice-Duck farming system model was developed in Region 2, which controlled golden apple snails and weeds, and increased rice yield by 36%. The cost of production was 29% higher than rice alone, but the net income was 5.2 times higher. The rice-duck farming system is seen as an innovative approach to optimize areas and increase profit. The same model was outscaled in Ilagan City and Tumauini, Isabela in 2020-2022. Rice production under the Rice-Duck Farming System yielded higher at 5.28 t ha^{-1} during the 2020-2021 dry season, 4.87 t ha^{-1} during 2021 wet season; and 4.71 t ha^{-1} during the 2021-2022 DS, 4.26 t ha^{-1} during the 2022 WS with yield increments of 1.98, 0.56, 0.40, and 0.26 t ha^{-1}, respectively. NSIC Rc480 variety was used following the technologies PalayCheck System, Rice Crop Manager, and Alternate Wetting and Drying. The rice-duck system has led to increased net income for farmers, reaching ₱57,572.00, ₱93,534.00, ₱75,590.00, and ₱73,824.00 per ha, respectively, as compared to rice monocropping. The rice plus duck system significantly transformed monocropping communities, with 85% of farmers adopting rice-duck systems. This low-cost technology has led to business enterprises, such as duck meat processing and egg processing. The system has trained adopters and co-operators, promoting products to beneficiaries and 7 BP2 program- accredited associations.

Keywords: Food sufficiency, rice-based system, rice-duck model, sustainable farming

Outscaling the rice + Muscovy duck farming system in Nueva Vizcaya

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DA-Regional Field Office 2

Nueva Vizcaya grows rice in a total irrigated area of 30,165 ha with 5.26 mt yield/ha. According to the Philippine Statistics Authority (2016-2020), average net income/ha of inbred rice in Region 2 is ₱14,213.98 and ₱32,336.60 with a Return on Investment of 23% and 59% for wet and dry seasons, respectively. On the other hand, duck raising is a lucrative industry because of the demand for egg and meat. However, it is not so economical if it relies solely on commercial feeds. This study explored the advantages of employing the PalayCheck system and the Fermented Feed Technology. The PalayCheck System as a holistic, integrated, and objective approach to rice production aims to increase yield up to 6 mt/ha. The Fermented Feed Technology helps reduce the cost of feeds for duck raising. It is composed of local ingredients such as rice bran, azolla, and golden apple snail that are readily available. Using these feeds, a farmer can obtain an average annual net income of ₱29,379.00 from a 6-head base population. Employing PalayCheck, an increase in yield/ha of 12% (5.9 to 6.6 mt) and 7% (5.5 to 5.9 mt) was obtained during the 2021 wet and 2021-2022 dry seasons, respectively. Duck raising using fermented feed added ₱20,492.43 for a one-year cycle. By integrating muscovy duck in rice production, a farmer can obtain 54% increase in total annual income of ₱132,130.02 with an ROI of 130% compared to monocrop rice at only ₱85,888.68 with an ROI of 102%.

Keywords: PalayCheck System, Fermented feed, Muscovy Duck, Rice+Duck Farming System, Monocrop

Enhancing rice+duck integration at DA-PhilRice CES Palayamanan Model Farm across various scenarios

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DA-PhilRice CES

The integration of ducks with rice crops as a farming system is an age-old technology which provides climate change-adaptive benefits and at the same time opportunities for farmers to expand their cashflow. The showcased Rice+Duck Integration System at the Palayamanan Model Farm has been maintained through the years. Each year presents a different scenario as subcomponents within the system undergo variations. Here, we present the scenarios from 2019 to 2022 and how the combinations from rice, ducks, and vegetable produce contributed to the overall income. Highest net income was recorded in 2021 at ₱66,175.05 with duck egg sales having the highest contribution. Gross sales from fresh eggs alone was recorded at ₱52,577.00. Among non-rice crops, the yield from papayas contributed the most with ₱12,181.25 gross sales. Unfortunately, typhoons brought down a lot of the papaya plants, reducing the area from 80m^2 in 2021 to 23m^2 in 2022. Meanwhile in 2019, the sales from taro gave the largest contribution at ₱12,346.00 but went down to ₱8,912.00 the following year as its production area had to be trimmed down to reduce rat infestation occurrence as well as to prevent clogging of irrigation canals. The integration of rice, duck, and vegetable crops as a farm system allows for multiple income sources that may provide some flexibility for farmers to adapt to varying situations that may come each year.

Keywords: climate change adaptation, Palayamanan, Rice+Duck integration

Community-based Participatory Action Research (CPAR) on rainfed rice-based areas in Namabbalan Norte, Tuguegarao City, Cagayan

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Low productivity due to monocropping is a key challenge in rainfed-lowland areas. Climate-resilient technologies were therefore showcased such as crop diversification, use of improved rice varieties, white corn and mungbean, adoption of improved cropping pattern (rice-rice-mungbean and rice-white corn/mungbean), mechanized rice crop establishment and provision of supplemental irrigation facility. The farmer-cooperators were actual tillers, and were capacitated through training programs on Good Agricultural Practices (GAP), Rice Crop Manager (RCM), Alternate Wetting and Drying (AWD), and method demonstrations on mechanized transplanting. The trainings guided farmers on proper use of seeds, fertilizers, water, and chemicals. Results show that the rice-rice-mungbean cropping pattern had increased rice yield from 1.43 t ha^{-1} to 4.96 t ha^{-1} (346%) during the wet season, and from 5.5 t ha^{-1} to 6.4 t ha^{-1} (16.4%) during the dry season. Said cropping system also reduced by 10-14% the cost of rice production/ha (₱4,408.96 – 7,258.08), and generated additional net income/ha of ₱10,811.14 – 17,966.00 from mungbean after rice deriving a total annual farm net income of ₱86,054.31 (345%) ha^{-1}. High ROI of 227% equivalent to a net income of ₱64,464.00 ha^{-1} was also attained in white corn intercropped with mungbean. The project convinced all farmers from Namabbalan Sur and Norte to adopt the interventions. The CPAR project awakened farmers to the need to reflect on their current farming practices.

Keywords: Climate-resilient, community-based, crop diversification, low productivity, rainfed rice

Identification of rice breeding lines with combined tolerance to saline and complete submergence at seedling and vegetative stages

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Rice yield is significantly reduced by either saline or submergence stress alone. Due to climate change, there are now more frequent typhoons, reduced river flows, and rising seawater levels, resulting in seawater intrusion in nearby rice fields. This phenomenon has introduced a new abiotic stress factor known as saline-submergence. This study identified promising rice lines with possible combined saline and complete submergence tolerance at seedling to vegetative stage. Twenty-eight elite recombinant inbred lines from 14 crosses were subjected to complete submergence at seedling and vegetative stages, and saline stress at seedling stage. The identified tolerant lines were genotyped using Sub1 gene-associated markers, ART5 and SC3, and Saltol quantitative trait loci (QTL), using SSR markers, RM10793, RM6711 and RM7075 to confirm the presence of the tolerance gene and QTL. The results indicated that the Sub1 gene was present in 6 (21%) lines, 14 (50%) exhibited a heterozygous response, and it was absent in 8 (29%) lines that experienced submergence at the seedling stage. At the vegetative stage, 23 (82%) lines were confirmed containing the Sub1 gene, 2 (7%) heterozygote for the trait, and 3 (11%) lines negative for the Sub1 gene. In saline stress screening and genotyping, 18 (64.29%) lines were identified tolerant and with confirmed presence of the Saltol QTL. The study identified two lines – PR51244-B-SUB7-3-1 and PR51244-B-SUB223-2-1-1 – with combined tolerance to saline and submergence stresses, and with confirmed presence of Sub1 gene and Saltol QTL. Further evaluation of these lines under saline-submergence stress will confirm their dual tolerance, as well as pinpoint their agronomic, yield, and grain quality traits.

Keywords: saline, submergence, Sub1 gene, Saltol QTL

Utilizing marker-assisted selection to improve salt tolerance in thermogenic male-sterile parents of Mestiso 19 and Mestiso 20 rice

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Salinity stress negatively affects crop production worldwide. Developing salt-tolerant rice varieties is a sustainable approach to mitigate salt stress. This study screened the salinity tolerance of three F2 populations derived from the crosses of parents of the TGMS commercial hybrids and a saline-tolerant rice variety at the seedling stage to identify plants with desirable traits for further evaluation and generation advancement. To verify the presence of the *Saltol* QTL, genotyping was conducted using robust simple sequence repeat (SSR) markers previously linked to saline tolerance including RM6711, RM 7075, and RM10793. The results revealed that 1,865 (56%) plants showed tolerance to salinity stress at the seedling stage: 625 plants (56%) in SP1, 528 plants (47%) in SP2, and 712 plants (64%) in SP3. Genotypic assessment identified 51 plants positive for the three markers used, of which 43 genotypes/plants with similar alleles to the saline-tolerant check *Pokkali* across markers were from the SP3 population (P line of M29 purple-based/*Salinas 13*), and the remaining eight were from the SP1 (5 plants) and SP2 (3 plants) populations. These selected plants are the most promising candidates for further evaluation and generation advancement to develop new rice varieties adapted to saline-prone environments.

Keywords: salinity stress, phenotype, genotype, SSR markers, Saltol QTL

Enhancing rainfed farm production: Adaptation of modern rice production technologies in Ilocos Norte

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Erratic weather conditions and labor shortage are the major problems of rainfed rice farmers in Ilocos Norte. These conditions often delay farm operations and critical activities such as crop establishment, nutrient and pest management, and consequently, reduce crop yields. To cope with these recurring problems, modern rice production technologies (POT) were introduced and evaluated in six sites each in Batac City and Currimao during the 2021–2022 wet seasons. The POT included the use of high-yielding inbred varieties; Minus- One Element Technique (MOET) for nutrient management under 5, 6, and 7 tha^{-1} yield targets; pest management strategies; and mechanization (transplanter and combine harvester); along with other appropriate crop management practices. Results showed that the POT produced significantly higher yields than the farmers' practice (FP) obtaining 11-26% (0.52-1.21 tha^{-1}) yield advantage across sites. Highest yield was obtained by 7 tha^{-1} target yield (5.81 tha^{-1}) followed by 6 tha^{-1} (5.55 tha^{-1}) and 5 tha^{-1} (5.12 tha^{-1}). Interestingly, the POT with 5 tha^{-1} yield target based on MOET even exceeded this yield level across sites resulting in highest nitrogen-use efficiency at 42% compared with the 6 and 7 tha^{-1} target yields at 33% and 28%, respectively. This indicates that increased fertilizer rates through MOET recommendations could result in improved production but at lesser nutrient efficiency. Meanwhile, mechanizing crop establishment reduced the costs by 53–60%, resulting in ₱5,884 ha^{-1} savings. Likewise, ₱8.58-12.86 kg^{-1} production cost can be achieved using the modern POT compared to FP at ₱12.15-15.42 kg^{-1} across sites. The POT also generates higher profitability obtaining 86-103% advantage over the FP. Overall, farmers produced higher yields and income at reduced production costs using the modern POT and recommended crop management strategies.

Keywords: rainfed rice, modern production technologies, Minus-One Element Technique, mechanization, nitrogen-use efficiency

Technology commercialization of multistress-tolerant rice varieties for upland farming communities

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Low productivity is among the pressing challenges in cultivating rice in upland areas due to drought and few available varieties. Farmers are not even aware of the available drought-tolerant varieties. To raise rice productivity in upland Isabela, multistress-tolerant and location-specific rice varieties were introduced in Cadu and Salindingan, City of Ilagan during the 2021 wet season and 2021-2022 and 2022-2023 dry season croppings. The technology interventions showcased were drought-tolerant varieties NSIC Rc 27, Rc 480 and Rc 192, and fertilization following soil test recommendation plus application of 100 kg ha^{-1} Gypsum as basal. The farmer-cooperators and adopters were trained on the upland rice package of technologies, and informal seed production system to spur availability of rice varieties. In the 2021 WS trial in Cadu, results showed a significant yield difference of 785.56 kg ha^{-1} using NSIC Rc 480 and Rc 27 over the farmer's variety, which generated additional net income of ₱6,862.89 per ha despite drought. In the 2021-2022 DS cropping in Salindingan, the three tolerant varieties outperformed farmer-cooperators' NSIC Rc 222, yielding 2,222.23 kg ha^{-1} and generating a 50.34% net income difference. In the 2022-2023 DS, yields of 1,503.25 kg ha^{-1} and 1,704.33 kg ha^{-1} were noted in NSIC Rc 27 and Rc 192, respectively, compared with 1,232.33 kg ha^{-1} for farmer's variety using good seeds in Cadu. Availability of seeds was sustained by doing on-station seed production. The seeds were distributed mainly to six farmers engaged in informal seed production systems. Adopting a package of technologies specifically on drought-tolerant varieties and soil test boosted rice yield by 75.98%. This package is recommended for outscaling in upland rice-farming communities in Cagayan Valley.

Keywords: Drought-tolerant varieties, Gypsum, low productivity, technology commercialization, upland rice

Modified planting calendar cum mechanization in water pump-irrigated rice areas of Quirino: Reducing adverse weather effects on rice yield

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DA Quirino Experiment Station

Quirino farmers initiate their planting season in November, which extends until the end of December peaking between mid-November and December. Rice plants enter their flowering stage in January and February, coinciding with the cool months and frequent rainfall. In the wet season, rice planting commences in mid-June, with the flowering and harvesting phases coinciding with the rainy months. Planting calendar is defined as a schedule of rice or other crops growing season. Generally, cropping calendar is used to avert the onset of rain and/or cold months during the critical growth stages of the rice plant. The project was conducted in Mangandingay, Cabarroguis from 2019 WS to 2020-2021 DS. Data collected were rainfall frequency pattern and actual yield that were subjected to RCBD analysis. In the modified planting calendar, wet cropping season started in May while the dry cropping season started in the last week of December. The modified cropping calendar using mechanical rice seeder had an average yield increase by 0.41 t/ha, and income augmentation of ₱13,515.00/ha/cropping during the wet season (2019 and 2020). For the dry season (2019-2020 and 2020-2021), average increase in yield was 0.20 t/ha while average additional income was ₱12,060.00/ha/ cropping. Modified Planting Calendar is recommended in areas that rely on water pumps and in irrigated areas where water availability is not a problem. Findings from this project serve as the basis for wider adoption of the project in Quirino.

Keywords: Irrigated rice, mechanical rice seeder, modified planting calendar, Quirino

Potential application of Climate-Agriculture-Modeling-Decision-Tool (CAMDT) in advancing rice yields in Ilocos Norte

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Cropping calendars have lost much of their utility due to changes in the local environmental and meteorological conditions. To modify the calendars, crop water requirement and agricultural meteorology should be integrated. Advances in crop modeling that simulates agri-meteorology have helped to make some crop simulation models available. The CAMDT is a tool that not only simulates or forecasts yield but also facilitates translations of probabilistic Seasonal Climate Forecasts (SCFs) like rainfall, and downscales the observed climate data according to the values of SCFs making the climate forecast more realistic to crop responses. CAMDT's simulations suggest that for Type 1 climate in Batac City, July 1 is the optimal planting date for NSIC Rc222 rice variety, with a forecasted yield of 9.5 t ha^{-1} during the wet season. In contrast, for the dry season with a planting window from November to January, January 20 is the recommended planting date, projecting a probable yield of 7.33 t ha^{-1}. To test the accuracy of the simulation, it was compared to the actual yield of both seasons: 7.89 and 7.22 t ha^{-1} in the wet and dry seasons of 2021-2022, respectively. This comparison resulted in R^2=0.60 and R^2=0.86 in WS and DS planting, making them statistically reliable for fitness of the forecasted to the observed yield. Therefore, it is advisable to utilize this information for suggesting adjustments to the timing of crop planting in specific areas, taking into account rainfall SCFs.

Keywords: CAMDT, cropping calendar, R^2, SCFs, Type I climate

Weather-based forewarning: A valuable adaptation strategy in managing rice stem borer and rice black bug in Midsayap, North Cotabato

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DA-PhilRice Midsayap

Forewarning or the prediction of forthcoming infestation of insect pest population which could cause economic damage is of foremost importance in an integrated pest management program. It is a viable tool in preparing for exigencies to minimize yield losses and production costs. This study aims to develop a weather-based forewarning system for white stem borer, *Scircophaga innotata* (Walker) and rice black bug, *Scotinophara coarctata* (Fabricius) in DA-PhilRice Midsayap, North Cotabato. Light trap catches of WSB along with meteorological observations across rice production areas were recorded from 2018 to 2021. A correlation study among RBB, WSB, and weather parameters was then made. Results showed that the average incidence of WSB (573) and percentage deadhearts (12.27%) and whiteheads (14.00%) were highest during the dry season (DS), leading to lower yield (3.22 t/ha) across the sampling period while highest yield (5.27 t/ha) was obtained during the wet season (WS) due to lower average number of WSB (186) and percentage deadhearts (6.10%) and whiteheads (4.17%). On the other hand, a higher average yield (5.11 t/ha) was recorded during the WS due to a lower average percentage of deadhearts and whiteheads (23.20%) compared to DS. Correlation studies between the incidence of major insect pests of rice (WSB and RBB), percentage damage, yield, and abiotic factors viz., rainfall, relative humidity, and temperature imply that the WSB and RBB population, damages, and yield had a significant positive correlation with rainfall and relative humidity and a significant negative correlation with average minimum and maximum temperature, respectively. The weather-based "pest alert" had been put in an application for field use in DA-PhilRice Midsayap rice production areas and during farmers' meetings. Forewarning of WSB and RBB is specific for Midsayap rice production areas and is expected to be used with pest management advisory to the rice growers of the region.

Keywords: Rice, Scircophaga innotata, Scotinophara coarctata, weather, pest severity

Can combined application of potassium (K) humate and gibberellic acid (GA3) control bacterial leaf blight and enhance maturity indices in rice?

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DA-PhilRice Midsayap

Bacterial leaf blight caused by *Xanthomonas oryzae pv. oryzae* is a devastating disease causing huge economic losses in rice production. This study assessed the effects of commercial potassium (K) humate and gibberellic acid (GA3) on the disease severity of BLB in addition to its impact on yield and other agronomic traits of rice under field conditions. Results revealed that K-humate and GA3 contributed to delaying the disease progress of BLB infection. The efficacy level was rated as moderate and less effective at 12, 18, and 30 days after inoculation (DAI) with a corresponding delay in the disease progress of 21 to 30 days. Interestingly, the combined application of K- humate at 200 g/ha and GA3 5-10 g/ha significantly shortened the flowering and maturity days, increased 1,000-grain weight, and yield differences among treated rices. This response could be an alternative solution to escape possible threats of water scarcity and heat stress due to high temperatures during rice flowering stage. Therefore, the combined application of K-humate and GA3 has the potential to manage BLB disease and could be an alternative solution to mitigate climate change, resulting in better yield with no significant yield loss.

Keywords: potassium humate, gibberellic acid, bacterial leaf blight, yield, agronomic traits

Managing rice bug using indigenous materials

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Rice bug (*Leptocorisa* spp.), also commonly called as *atangya, piyangaw, or tiyangaw*, is among the major insect pests of rice. Insecticide application remains the most commonly used technique in managing this insect. Hence, there is a need to develop an alternative management technique that is effective, economical, and environment-friendly. Different designs of traps, made from available and low-cost indigenous materials, were evaluated under farmers' fields in Mapangpang, Science City of Muñoz, Nueva Ecija and at the PhilRice Central Experiment Station. The evaluation was conducted from 2021 to 2022, all seasons. Fresh invasive apple snail or *kuhol* that serve as rice bug attractant was attached to each trap. Traps were installed in each ricefield at 10 meters apart from flowering to harvesting stages. The number of rice bugs caught inside each trap at 1, 2, 3 weeks after the installation was counted and analyzed. The trap developed under this study caught up to 120 rice bugs during the dry season and 521 during the wet season. To date, there is no commercially available rice bug trap in the market and farmers solely rely on the commercially available insecticides to manage rice bugs.

Keywords: rice bug trap, Leptocorisa spp., indigenous material, attractant

Fall armyworm, *Spodoptera frugiperda* (J.E. Smith): An emerging pest of rice in the Philippines

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The fall armyworm (FAW) is an invasive insect pest that is native in the Americas. It is polyphagous and commonly infests corn and other crops including rice. In the Philippines, however, little is known of its preference to rice; hence, regular monitoring of its population, damage and spread was conducted in areas reported with FAW infestation. FAW was first reported infesting rice seedlings in Cagayan in May 2021 and in 13 other municipalities in Region 2. We observed its recurrent invasion in rice seedbed areas in Gonzaga and Santa Ana, for 3 years since its first invasion. Further, FAW was observed in June 2022 damaging direct-seeded rice at seedling stage in San Jose City, Nueva Ecija and in July 2023 in Maligaya, Science City of Muñoz. For awareness of this emerging pest in rice, this study provides basic facts, areas infested, and options to manage FAW.

Keywords: Fall armyworm, rice, Spodoptera frugiperda, invasive pest

Resistance of high temperature-tolerant elite lines against major rice pests and diseases

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DA-PhilRice CES

Biotic stresses are among the major factors that result in yield decline and poor productivity. To adapt to the changes in farming practices and shifts in environmental conditions, some organisms have emerged as pests. Varietal improvement is key to addressing the challenges relating to pest emergence and climate adaptability of rice varieties. Hence, it is crucial to identify rice lines that can withstand adverse environmental conditions and with promising reactions against major biotic stresses. In 2022 wet season, 25 high temperature-tolerant elite rice lines were evaluated at the PhilRice Central Experiment Station for resistance to major insect pests and diseases under induced method and under modified field conditions. The evaluation followed the procedure set forth in the National Cooperative Testing manual for rice. Among the elite lines evaluated, PR52477HTR-39-1-1-2-B and PR52477HTR-39-1-2-3-B, PR52218HTR-4-1-2-2-B, and PR52479HTR-7-3-2-2-B showed resistance to blast, bacterial leaf blight (BLB), and stemborer (SB) whitehead damage, with intermediate resistance to brown planthopper (BPH) and green leafhopper (GLH). Meanwhile, PR52258PKR-18-3-1-2-3, PR52222HTR-2-1-4-2-B, and PR52481HTR-26-2-1-3-B exhibited resistance to BLB and SB whitehead damage, with intermediate resistance to blast, BPH, and GLH. Aside from their tolerance to abiotic stress, the identified lines demonstrated resistance to intermediate resistance to biotic stresses, which made them adaptable to stresses brought about by climate change.

Keywords: heat tolerance, biotic stress, varietal improvement

On-farm evaluation of entomopathogenic fungi, **Beauveria bassiana** *(Bals.) Vuill for controlling rice bug in Agusan Del Norte*

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DA-PhilRice Agusan

The fungus *Beauveria bassiana* is one of the biological control agents that are pathogenic to some major insects under different orders. On-farm evaluation was conducted in Agusan del Norte conditions from January to December 2021-2022 at Antonio Luna, Cabadbaran City to assess the potentials of *B. bassiana* for the management of rice bug and compare the economic advantage for the control measures including the fungus (PhilRice-managed) and insecticides (farmer's practice). *B. bassiana* was highly pathogenic to rice bug population after two fungal applications showing 16.7%-80% mortality at 10 days post-treatment in PhilRice-managed crops compared to 6.7-20% mortality in the farmer's practice crops in Jan-Dec 2021 cropping season. In Jan-Dec 2022, 43%-63% and 13%-26% mortalities of the rice bug were recorded in PhilRice-managed and farmer's practice, respectively. Mortality was observed at 3 days (16-67%) and increased at 21 days to 83% mortality. Only 27.3% mortality of the rice bug was recorded through visual count in PhilRice-managed crops; less than 10% mortality was recorded in the farmer's practice. Cumulative mortality of the insect showed an increasing trend from 3-17 days after spraying of *B. bassiana* causing 1.5%-33.1%. In addition, both field-collected and visual count of the insects were infected with the fungus causing 26.67%-93.33% and 2.37%-18.37% in farmer's practice, respectively. Overall, the results showed that the use of *B. bassiana* was 60% cost-advantageous over chemicals for the management of rice bugs. Thus, it is cost-effective and environment-friendly.

Keywords: entomopathogenic fungi, Beauveria bassiana, rice bug, mortality, control

Is VarMix® the new norm for developing climate change-resilient multi-trait genotypes?

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DA-PhilRice CES

Mixing varieties with different genes for resistance is a known approach for disease management in various crops. In the past 10 years, its effectiveness for controlling diseases was investigated in different rice-growing countries. In the Philippines, mixing rice varieties or varietal mixture (VarMix) is currently being explored for its capability not only to lessen biotic stresses but also to mitigate the effects of water scarcity. This paper highlights the VarMix combination that has excellent yield performance in selected locations nationwide based on the following analysis: Relative mixing effect ($MErel_{ml}$); Maximum mixing effect ($MEmax_{ml}$); Inter varietal diversity ($D(x)_{ml}$); Yield stability across environments (Si2); regression coefficient (b_1); and Sensitivity of genotypic entities s(di)2. It also shows the above and below-ground VarMix mechanism for conquering biotic stresses and water scarcity. Furthermore, it shows VarMix market acceptability features, where some combinations are better than NSIC Rc 216 and Rc 160, thus having higher price in the market. Lastly, this paper introduces trait-based SNP markers (biotic, abiotic, and grain quality) present in six selected single rice varieties used in creating VarMix combinations.

Keywords: VarMix, SNP, stresses, grain quality, market players

Genetic profiling and yield evaluation of wide hybridization elite rice breeding lines

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Wild rice species have high genetic diversity, which when used in interspecific crosses can result in lines with favorable alleles that can be useful in developing rice varieties. Using SNP-trait characterization, the genetic profiles of 19 promising advanced lines from the 2022 wet season and 2023 dry season wide hybridization yield trials (WYT) located in the UPLB Rice Experimental Area (14.159172 N, 121.267199 E) were generated. Nine lines with positive yield advantage over the highest-yielding check variety, NSIC Rc476, revealed three to six useful QTLs. C10961WH-2-3-3-2-3-3 had the highest yield of 2938.40 kg/ha and yield advantage of 22.75%, and contained major QTLs: *qAG1* and *qAG3* for anaerobic germination, *qDTY3.2* for drought response; and *HIS1* for herbicide resistance. On the other hand, C10878WH-5-3-1-3-2-2-2-2-1 with a yield of 2393.85 kg/ha and yield advantage of 16.92% had six QTLs, namely: *qAG1* and *qAG3* (anaerobic germination), *qDTY3.2* (drought response), *TSV1* (Tungro resistance), *Hd1* (photoperiod sensitivity), and *HIS1* (herbicide resistance). These lines will undergo various screenings to confirm the expression of the detected QTLs. Moreover, the lines with the highest number of QTLs detected and yield will be used as donor parents for rainfed lowland rice breeding.

Keywords: Wide hybridization, rice, SNP, drought, disease

Fast-tracking mutation breeding: Field rapid generation advance for speed breeding in rice

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Increasing genetic variance and shortening the breeding cycle duration can improve genetic gain in a crop breeding program. However, rice varietal development via conventional methods of breeding and generation advance of segregating populations normally takes more than a decade from hybridization to commercial release. Using mutation can quickly induce genetic variation in rice without gene introgression, and can result in a large population with potentially useful traits to enhance the crop's agronomic performance, grain yield, nutritional quality, stress tolerance, and adaptability. Combining mutation breeding with rapid generation advance techniques to speed up the breeding cycle in a large and diverse population provides the opportunity for increasing genetic gain and developing better varieties in a relatively shorter time. To achieve this, a field rapid generation advance (FRGA) protocol for mutation breeding is being developed by the UPLB-Rice Varietal Improvement Team. It involves limiting irrigation and nutrient application in a densely planted population to induce early seed setting in rice. Five mutant populations of Palawan, Milagrosa, Balatinaw, Kamros, and C4-63G with 100-150 M lines each were managed using FRGA. In 2023, 3-4 generations were produced using only 50% of the recommended fertilizer rate, 10 x 10 cm plant spacing, and minimal irrigation. Plant maturity from the FRGA set-up ranged from 78 to 85 DAS, compared with non-FRGA with 88-92 DAS depending on the variety. Further shortening the period of generation advance is aimed at developing a mutation FRGA system that will offer a fast and efficient mutation breeding strategy.

Keywords: mutation breeding, FRGA, early maturity, breeding cycle

Revisiting collection sites for crop wild relatives of rice (*Oryza sativa*) in the Philippines

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Wild rice species (WRS) thrive under different biogeographic, biotic, and abiotic stressed conditions. WRS can serve as a major reservoir of important genes for rice crop improvement through the acceleration of genetic gain and development of rice varieties preferred by farmers and consumers. To ensure global food and nutrition security through sustainable rice production, this study was conducted to revisit the collecting sites of four WRS in the Philippines. Seven populations from four WRS were collected: two populations each of *O. minuta*, *O. rufipogon*, and *O. meyeriana*, and one population of *O. officinalis* from Luzon, Visayas, and Mindanao. Populations of *O. minuta* were identified in the swampy areas of Pangil and Victoria, Laguna. *O. rufipogon* populations were located in the shallow waters of Lake Apo and Lake Napalit in Bukidnon, Northern Mindanao. *O. officinalis* was found in unused lands near rice fields in Kabankalan City, Negros Occidental. *O. meyeriana* populations were found in Aborlan and Quezon, Palawan. Morphological traits of WRS were observed, and the collecting sites were characterized. Further characterization of existing WRS and an increase in the number of collecting sites are recommended to develop better conservation and pre-breeding programs.

Keywords: wild rice, Oryza sativa L., morphological traits

Participatory performance testing and validation of Next-Generation rice varieties in Region 10

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Rice production faces formidable challenges due to the impact of climate change. To address these constraints, collaborative efforts were undertaken by breeders from IRRI, PhilRice, and UPLB to develop next-generation rice varieties with several desirable traits such as climate-resilient, high yield, and pest and disease resistance. The study aimed to introduce and demonstrate the performance of newly released rice varieties in their target environments; validate the recommendation domain of a variety under a specific ecosystem; and recommend the mass production, dissemination, and use of new inbred rice varieties through seed production. Researcher-managed participatory varietal selection in RCBD was conducted in 10 sites in Northern Mindanao for lowland irrigated (6), lowland irrigated special purpose (4), rainfed/ drought-tolerant (5), and saline-tolerant varieties (6). Across locations, the best adapted varieties for lowland irrigated were NSIC Rc 436, Rc 442, and Rc 506 that averaged 7.7 to 8.2 t/ha. Their yield increments ranged from 72.7% to 82.8% over the national productivity (4.5 t/ha), and ROI ranged 136%-153%. For lowland irrigated special purpose (aromatic), top three varieties were NSIC Rc 342SR, Rc 344SR, and Rc 218SR, which yielded from 7.4 to 8.9 t/ha. Their yield increments ranged from 44.2% to 60.0% over the national productivity, while ROI ranged from 127% to 173%. Under the rainfed ecosystem, NSIC Rc 572, Rc 478, and Rc 27 yielded 6.3 to 6.5 t/ha; yield increments ranged from 38.9% to 95.5% and ROI from 92% to 98%. Among lowland saline-tolerant varieties, NSIC Rc 556, Rc 528, and Rc 554 yielded 7.0 to 8.0 t/ha across locations. Yield increments ranged from 55.6% to 77.8% and ROI at 115%-146%. The participation of farmers, traders, and seed growers in the selection process resulted in widespread adoption of the new varieties for recommendation to the DA RFO-10 and LGUs for commercialization and distribution to rice farmers.

Keywords: Next-Generation, climate change, rice varieties, rice ecosystems, climate change-resilient

On-station production of high-yielding and short-maturing inbred rice varieties for irrigated and adverse rice ecosystems of Cagayan Valley

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Cagayan Valley ranks second highest producer of rice in the country, yet the yield gaps among farmers are very wide, ranging 70 to 200 bags per hectare. Even with the presence of modern rice production technologies, there remain farmers in Cagayan Valley who continue to rely on saved seeds. Consequently, average yield remains low at 3.7 t/ha although 4.7 t/ha is being achieved in irrigated areas. While many areas are advantageous for rice cultivation, yield could not be optimized because low adoption of high-quality seeds. With its aim to provide registered seeds to seed growers and certified seeds to farmers, the DA-Northern Cagayan Experiment Station (DA-NCES), as member of the Seed Network, pursues their production of high-quality seeds as well as organically grown traditional rice varieties. The region has irrigated and rainfed lowlands, upland, and saline rice ecosystems. Rice varieties suited to these ecosystems are produced in the station to ensure a stable source of high-quality seeds. Also, organically grown Special-Purpose Rices such as pigmented, Japonica, and glutinous are available for farmers as options considering their health benefits. The station ensures the availability of seeds every season to address the needs of our local seed growers and farmers. Hence, this is a commitment of DA-NCES to produce more high-yielding quality rice seeds of recommended varieties for various ecosystems and more seeds of upcoming new series of rice varieties for farmers to choose from in coping with climate change.

Keywords: High-Quality Seeds, Inbred Rice, Registered Seeds, Certified Seeds

Growing in the deep: Seedling emergence of rice varieties under deep sowing conditions

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Deep sowing is a technique associated with dry direct seeding of rice (DDSR), which allows farmers to reduce water requirement and labor costs associated with transplanting. Deep sowing can also contribute to increasing climate resilience of rice because seeds sown at a deeper level can escape short-term drought by using the residual moisture in the soil for germination. However, not all varieties can germinate well and remain vigorous when sown deeply, and this could have an impact on crop establishment and yield. Thus, seedling emergence of various rice varieties under deep sowing conditions was investigated. Some 30 rice varieties for irrigated, rainfed, and upland environments, and a check variety for deep sowing tolerance (Kasalath) were planted under two soil depths (control - 3cm and deep sowing - 8cm). Regardless of sowing depth, seedlings from all varieties had similar root lengths, and majority of them had similar shoot lengths and dry weight (30 varieties) at 14 DAS. However, mean seedling survival across varieties was significantly lower in deep sowing (50.25%) than control (80.61%). Notably, survival rate did not decline with deep sowing for varieties UPL Ri-5, Pandan, PSB Rc 32, NSIC Rc 282, and Rc 506, with UPL Ri-5 having the highest survival rate (71.33%) among all the varieties. Reduction in vigor index ranged from 43.92 to 96.40% among varieties relative to the control. Varieties with the least reduction in vigor index (below 50%) were UPL Ri-5, Pandan, Kasalath, NSIC Rc 282, and Rc 506. Similarly, these were the varieties which survival rate was not affected by sowing depth (except for Kasalath). This study shows the variable response of rice varieties to deep sowing, and that screening for seedling emergence under deep sowing is essential for identifying cultivars that would establish well even under DDSR conditions.

Keywords: DDSR, deep sowing, seedling emergence, germination, vigor

Newly released early-maturing NSIC rice varieties for direct wet seeding culture: Alternative options to mitigate El Niño occurrence

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The shift from transplanting (TP) to direct wet seeding (DWS) culture has gained popularity because of its low input demand and advantages: requires less water, less drudgery and saves labor, early crop maturity, low production cost, better soil physical conditions for following crops, and less methane emission. Several constraints such as high weed infestation including weedy rice, increase in soil-borne pathogens, poor crop establishment, lodging, and disease incidence have been observed but were mitigated by appropriate technologies. This proves that DWS is a technically and economically feasible alternative to TP. Since 2004, PhilRice has been breeding for DWS rice in the irrigated ecosystem. By 2011, 15 varieties had been bred for TP but were also suitable for DWS. Of the 19 registered varieties from 2012 to 2019, seven including the first variety for DWS, NSIC Rc 298, and NSIC Rc 394, Rc 396, Rc 398, Rc 402, Rc 442, and Rc 512 performed better for DWS. These varieties have anaerobic tolerance, faster initial growth, high early vegetative vigor, early canopy cover, and lodging resistance. In 2021-2022, 14 newly released varieties were approved for national and regional recommendations. These varieties are high-yielding averaging 4.6 to 5.6 t/ha, and maximum yield of 7.7 to 9.6 t/ha.

Keywords: Philippine Seed Board, National Seed Industry Council, Rice Varietal Improvement Group, direct wet-seeded rice, recommendation domains

Rice cultivar response to incremental NPK rates: Effect of agro-climatic, soil, pest dynamics, and varieties

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Maximizing yield and income potential from hybrid and inbred rice production must be accompanied by appropriate nutrient management practices. This study determined the yield response curve of selected public-released hybrid and inbred varieties to accumulative rates of nitrogen (N), phosphorus (P), and potassium (K) fertilization and their effects on yield, nutrient-use efficiency, residual nutrients, pest and disease incidence, and production cost. Varietal x fertilizer experiments laid out in Split Plot Design were conducted for two consecutive cropping seasons in Los Baños (2021 DS and WS; Lipa loam; 4.09% soil organic matter [SOM]) and Pila, Laguna (2022 DS and WS; Mariking silty clay loam; 3.4-5.1% SOM). The inbred (NSIC Rc 216 and Rc 218) and hybrid (M19, M20, and M73) varieties were subjected to increasing levels of N application, from 0 to 120 kg N/ha for inbred and up to 240 kg N/ha for hybrid. P and K were added at the rates of 0 and 40 kg/ha, respectively. Hybrids had higher yields than inbreds by ~1 to 2 t/ha with a lower production cost of ₱0.3 to 10/kg across the two experimental sites, cropping seasons, and fertilizer treatments. No significant yield increases beyond 40 kg/ha N application were observed regardless of season, varieties, and location which may be attributed to the relatively high SOM content of the study sites. Production cost was pulled in the treatments with higher N rates due to minimal yield increase. The 40 kg/ha N treatment also had higher Agronomic Efficiency of Nitrogen (AEN) compared to plots with higher N rates. Plant and grain nutrient uptake is highly influenced by variety, yield, and fertilizer rates. Even though the nutrient content (N, P, and K) of inbred and hybrid varieties across the fertilizer treatments were comparable, the higher yields obtained from hybrids suggest that it extracts higher amounts of nutrients from the soil. With this, continuous cropping of hybrids may demand for a higher nutrient requirement from outside source due to soil nutrient mining. Meanwhile, the yields tend to decrease during the wet season due to higher incidence of pest (i.e., leaffolders) and disease (i.e., tungro, sheath blight), lower solar radiation, and extreme weather conditions (i.e., typhoons, winds). Production cost, on the other hand, is also affected by the ever-changing cost of inputs, specifically fertilizers, and labor. The above results suggest the important role of SOM in providing inherent nutrients for the crop which may be an important indicator of N reserves in the soil, thereby aiding in the assessment of soils for N requirements. The yield effect of increasing N levels in both inbred and hybrid varieties still needs verification, especially in areas with low SOM.

Keywords: soil organic matter, inbred, hybrid, nutrient rates, yield response curve

Mycorrhiza plus beneficial bacteria in Mykoplus biofertilizer enhanced rice crop performance in three farmer-managed demonstration trials

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This paper presents farmers' experiences in using Mykoplus biofertilizer for lowland rice production. Biofertilizers are packets containing live, effective strains of microorganisms that increase activities in the soil to provide nutrients for the host plant. Mykoplus biofertilizer is solely produced and distributed by BIOTECH, UP Los Baños as a result of R&D projects funded by the Department of Science and Technology-PCAARRD and PCIEERD. Mykoplus is unique because it contains both endomycorrhizal fungi and beneficial bacteria that strengthen plant and root structure, leading to better crop growth and yield. The three demonstration sites were in Bayog, Los Baños and Alicia, Sta. Cruz, Laguna; and Fronda, Talugtug, Nueva Ecija. General observations from all sites with Mykoplus biofertilizer application on rice showed: 1) greater resistance to bacterial leaf blight (BLB) and bacterial leaf streak, where only the control plants had both diseases; 2) greater resistance to water stress caused by uneven water flow in the farm site; 3) relatively greener leaves of the Mykoplus-applied seedlings, suggesting that there is no need to apply second dose of fertilizer nitrogen; and 4) heavier rice grain yield compared with the control plants. The synergistic action of the microorganisms in the biofertilizer provides a robust microbial consortium that helps the plant adapt to varying climate changes, while ensuring greater access to nutrients and water.

Keywords: Biofertilizer, Mycorrhiza, Mykoplus, rice, farm demonstration trials

Enhancing productivity and profitability in lowland irrigated rice through balanced fertilization and pest management strategy in Nueva Vizcaya

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DA-Regional Field Office 2

The study determined the productivity and profitability of certified inbred rice in lowland irrigated zinc-deficient ecosystems using Balanced Fertilization and Pesticide Management Strategies (BFP) during the wet season of 2022. BFP is the use of soil laboratory analysis-based fertilization + carrageenan for nutrient management and integrated pest management for pest and disease control. Results pointed to a significant difference in yield of NSIC Rc402 variety between BFP (7.23 t/ha) and Farmer's Practice [6.25 t/ha] (FP). Significant difference was also observed on plant height and number of productive tillers with 109.5 cm and 15 (BFP) compared to 100.5 cm and 13 (FP). Likewise, longer panicles and higher number of filled grains were observed in BFP with 25.7 cm and 105 compared to 24.3 cm and 95 under FP. Grains were also heavier with 28.64 g compared with 28.17 g with FP. Using the combination of chemical and Biological Control Agents (BCAs) on pest and disease management, infestation and infection rate of leaf folder and bacterial leaf streak under BFP was lower with 3.87% and 4.53% compared with 6.24% and 5.63% with FP, respectively. Due to higher yield and reduction on the cost of inorganic fertilizer, rice production in lowland irrigated zinc-deficient ecosystems is more profitable using BFP compared with FP. The average net income per hectare under BFP is ₱61,524.16 which is 37.29% higher than FP with ₱44,814.01.

Keywords: Balanced fertilization and pesticide management, biological control agents, Carrageenan, Certified inbred rice variety, lowland irrigated rice

From scarcity to abundance: The RCEF success story in Maggok, Hungduan, Ifugao

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Climate change continuously affect agriculture that hampers food sufficiency. Advance technologies for food production have been introduced to farmers in helping ensure sustainable food supply. Despite this, Maggok farmers are less worried about climate change threats and the adaptability of rice varieties due to the cool and unique topography of Hungduan, Ifugao. Most farmers plant traditional heirloom rice once a year, using poultry manure and crop biomasses as their primary nutrient sources. Yields are low ranging from 1 to 2t/ha only. Because production does not sufficiently supply their rice requirement, they usually buy from neighboring municipalities. While the RCEF program excluded heirloom rice areas, farmers in Maggok requested their LGU to include them when they heard about the free seeds. Initially, the seeds given to them were used as "*singit crop*" so as not to disturb the heirloom season. With the approval of the DA-RFO CAR, an initial 40bags inbred certified seeds were delivered to the recipients in 2021WS along with a technical briefing on crop establishment and nutrient management. NSIC Rc480 and Rc216 yielded 4.2t/ha, which is higher than their traditional seeds (1-2t/ha). Farmers were impressed; hence, they requested more seeds and got 250 bags in WS2022. With their impressive yields, PHilMech granted them a village-type ricemill that enabled them to process and even transport their rice to other barangays in Hungduan and Kiangan, and pay for the needs of their families. The inclusion of the Maggok Community in the RCEF program has transformed the lives of local farmers.

Keywords: RCEF Program, Certified Seeds, Technical Briefings

NextGen varieties: Performance under irrigated and stress conditions in Cagayan Valley

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DA-RFO 2

Rice farmers may become more competitive in the global market by raising productivity. A way to increase rice output is to introduce new, high-yielding rice cultivars. The NextGen Plus initiative, which ran from dry season of 2020 to wet season of 2022, aimed to hasten the introduction and adoption of rice varieties with greater yields by more than 5% compared to local varieties. The Participatory Performance Testing and Validation (PPTV) trials were conducted in farmer-partners' fields across the irrigated and adverse rice-growing systems in Cagayan Valley. During the dry season, NSIC Rc506 yielded more in Cagayan (5,964 kg/ha) and Nueva Vizcaya (10,598 kg/ha) while Rc512 and Rc442 produced more in Isabela (6,770 kg/ha) and Quirino (6,059 kg/ha). Rc508 had the highest yield during the wet season in Cagayan (5,916kg/ha), Rc512 in Nueva Vizcaya (9,612 kg/ha) as well as Rc442 in Quirino (5,726 kg/ha) and Rc506 in Isabela (6,358 kg/ha). In Cagayan, during the dry and wet seasons, respectively, Rc572 (3,927 kg/ha) and Rc568 (5,076 kg/ha) produced the highest yields in rainfed/drought-prone locations. In Isabela, Rc576 (5,272 kg/ha) and Rc578 (5,459 kg/ha) yielded the highest during the dry and wet seasons, respectively. Rc534 (4,057 kg/ha and 3,895 kg/ha) obtained the highest yields during the dry and wet seasons, respectively, in the saline-prone areas of Cagayan. The use of stress-tolerant varieties are potential solutions to improve productivity in areas aggravated by climate change.

Keywords: NextGen varieties, PPTV, irrigated, stress conditions, saline-prone, grain yield

A panel data study on the factors affecting rice production in the Philippines

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Rice output in the Philippines is influenced by a range of factors. Apart from considerations related to production, climate change may have started to make inroads into the relatively poor performance of the rice sector. This is concerning given that the rice industry is an economic driver across the country. This study investigated the catalytic influence that (exogenous) climate variables and selected endogenous (production) variables have on rice production in six rice-producing areas from 2006 to 2019 by utilizing panel data estimates and the augmented Cobb-Douglas Production function. The effects of each explanatory variable on the dependent variable were empirically verified using OLS, Fixed, and Random Effect Regression methods. Fixed effect regression is determined to be the most suitable estimation method for the study among the three. For irrigated farms across regions in the Philippines, regression results showed that an increase in Land Area and application of Urea would increase rice production output. Subsequently, a decrease in rice production is obtained when Average amount of Rainfall (ARF) increases as well as Minimum Temperature (Tmn). The application of Complete fertilizer has negligible effects on production. For rainfed areas, Land Area, application of Urea and Complete fertilizers exhibited increase in rice production; whereas Average Amount of Rainfall exhibited negative effects on rice production. Results showed that increase in land area devoted for rice production, irrigation, and use of other inputs aside from inorganic fertilizers are keys to ensuring rice security. Aside from which, proactive climate variability adaptation measures are required to mitigate the long-term effects of changes in temperature and rainfall on local rice production.

Keywords: rice production, climate change, panel data, regression

Climate Risk Vulnerability Assessment for agriculture in Aklan, Antique, Capiz, and Guimaras

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The study was conducted in Antique, Aklan, Capiz, and Guimaras from 2020 to 2021 to assess the Western Visayas provinces' risks and vulnerabilities to climate change. The evaluation followed the Climate Vulnerability Assessment (CRVA) framework. Among the key accomplishments of the study are as follows: 1) agricultural vulnerabilities to climate change of the four provinces objectively assessed; 2) GIS–guided visualization maps generated; and 3) vulnerability of the four provinces studies determined in terms of sensitivity, hazard, and adaptive capacity index. The vulnerability assessments found that in Aklan, the municipalities of Batan, Malinao, Makato, Tangalan were most vulnerable to climate change while Kalibo was the least vulnerable. In Antique, Anini-y, Hamtic, Belison, Laua-an, and Libertad were predicted to be most vulnerable while Patnongon was considered least vulnerable; in Capiz, Jamindan, Dao, and President Roxas were found most vulnerable while Panay and Ivisan were least vulnerable; and in Guimaras, Sibunag, and San Lorenzo were found most vulnerable to climate change while Nueva Valencia was rated the least. The results highlight appropriate interventions needed by vulnerable communities, which are useful for climate change adaptation planning.

Keywords: Climate change, climate risks, vulnerability, climate change adaptation, climate change adaptation planning

THEME 2: Farm-Clustering and Consolidation

Rice Business Innovations System (RiceBIS): Strengthening farmers' entrepreneurial competency for a better community!

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Low income has always been a problem, with average net profit of marginalized rice farmers in the Ilocos Region ranging from ₱9,000 to ₱14,000 per ha only. Farmers belong to the poorest sector and posted the highest poverty level at 34.3% (PSA, 2017). Hence, the RiceBIS project was piloted to organize farmers into a cooperative for agroenterprise development, with strong linkage to markets. Farmers from three organizations were united into a group, the Rayuray Farmers Agriculture Cooperative (RFAC). They were trained in rice production, processing, and business management. They ventured into *palay* trading, well-milled and Brown Rice production, and custom service of 4-wheel tractors. The cooperative was linked to other government agencies to help in the agroenterprise ventures. ATI RTC1 granted ₱103,000; DOST-1 provided ₱131,000; DA-RFO 1 granted ₱1M, a 4-wheel tractor, and other farm utilities; and the Provincial Government of Ilocos Norte also provided ₱50,000 and marketing assistance through its Product-to-Consumer Program. For technical assistance on business management and cooperative development, MMSU-College of Business, Economics, and Accountancy provided capacity-building activities. In 2022, the cooperative gained a total net income of ₱360,153 (*palay* trading: ₱143,160; brown rice: ₱148,151; milled rice production: ₱43,277; custom service: ₱25,565). To date, their total asset is ₱4,244,457 from ₱68,793 start-up. LGU Batac closely monitors and provides support to the RFAC activities.

Keywords: agroenterprise, business management, capacity enhancement, cooperative, marketing

Wholesome goodness in every scoop: Sensory attributes and nutritional quality of stirred-type buffalo milk-based yogurt enriched with fermented rice bran

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The prevalence of consumer interest in the role of food in promoting and preventing non-communicable diseases created an expansive market demand for manufacturing functional foods, particularly those rich in natural antioxidants. Therefore, this study evaluated the potentials of fermented bran from antioxidant-rich pigmented rice cultivars in producing a buffalo milk-based yogurt, one of the most commonly consumed probiotic-rich dairy products. Since fermented rice bran (FRB) is produced through a combination of solid-state and submerged liquid fermentation systems using probiotic strains, its bioactive components are more readily available in the body, which may provide additional health benefits with the nutritious buffalo milk-based yogurt (BMBY). In collaboration with the PCC at CLSU, stirred-type BMBY yogurts were then enriched with varying concentrations of black and red FRB powder and evaluated for their sensory characteristics, microbial load, phytochemical content, antioxidant activity, physicochemical properties, and proximate composition. The sensory attributes and overall acceptability of FRB-enriched (0.5-1.0% wt/wt) yogurts were comparable with the control and safe to consume as indicated by their low aerobic plate count and undetected pathogens. It was also observed that the phytochemical properties and free radical-scavenging activity gradually improved as the amount of added FRB powder increased. The FRB-enriched yogurts were found to be a good source of zinc (0.52 mg/100g) and excellent sources of protein (12.9-13.0%), dietary fiber (0.90-2.86%), iron (0.36-2.40 mg/100g), magnesium (15.02-17.14 mg/100g) and calcium (151.30-166.70 mg/100g). A 125-gram serving of FRB yogurt had higher amounts of the recommended energy and nutrient intake (%RENI) for protein (22.36-22.71%), dietary fiber (5.63-17.88%), iron (3.75-25.21%), magnesium (7.82-8.93%), zinc (9.81-10.19%), and calcium (25.21-27.78%) in 19 to 29-year-old males as compared to the control. Results from this study have shown the potentials of using FRB in developing a nutrient-enriched fermented dairy product due to its better nutritional quality, probiotic contents, phytochemical compositions, and antioxidant properties.

Keywords: antioxidant activity, buffalo yogurt, fermented rice bran, functional foods, yogurt

Beyond the color of pigmented rice: Exploring the biological activity of varieties with high antioxidants

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Red and black rices contain bioactive compounds including phenolic acids and flavonoids with high antioxidant capacity. They play key roles in attenuating oxidative stress, which is responsible for the onset and progression of chronic diseases, particularly cardiovascular, cancer, and diabetes. These are the leading causes of death in the Philippines. Pigmented rice varieties have been profiled for phytochemicals before but their potential biological activities and the effects of processing methods on their antioxidants have not been fully investigated. Hence, this study evaluated the effects of polishing and cooking on the antioxidants of pigmented rice and the human cancer cell cytotoxity and anti-proliferative properties of the crude ethanolic extract. Selected black and red rice varieties were dehulled, polished, and cooked followed by the determination of L*a*b* color values, total phenolic (TPC), flavonoid (TFC), anthocyanin content (TAC), and antioxidant activities. After polishing and cooking, pigmented rice was able to retain 23.1% of TPC, 25.6% TFC, 20.5% TAC, 23.8% DPPH radical-scavenging activity, 24.0% ABTS radical-scavenging activity, and 26.9% ferric-reducing antioxidant power. Black rice samples retained higher phytochemicals and antioxidant activity than red rice after cooking. The cytotoxicity of the extract of the varieties with the highest health-promoting properties, Dinorado red and Balatinaw black rice, against human lung cancer cells (A549) exhibited the lowest IC_{50} values. Additionally, no significant cytotoxic effect on the normal lung cells (MRC5) was observed. The anti-proliferative effects of these extracts against these cells are currently being evaluated using MTT assay. Dinorado and Balatinaw samples with higher antioxidant activities consequently had more prominent cytotoxic effects on cancer cells without compromising the normal cells. The bioactive compounds remaining in cooked unpolished pigmented rice provide an antioxidative and anti-cancer potential with extensive applications in health and nutrition.

Keywords: pigmented rice, phytochemicals, antioxidants, anti-proliferative property, biological activity

Delivering nutritious Malusog Rice to vulnerable population with high malnutrition and assessment of consumer acceptability

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Despite different interventions, Vitamin A deficiency (VAD) remains a significant public health concern in the Philippines affecting the vulnerable children, pregnant, and lactating women. More than causing visual impairment, it affects physical and cognitive development and weakens the immune system against severe infections that can lead to mortality. As a complementary solution to VAD, rice was biofortified with beta-carotene (pro-vitamin A) to produce Golden Rice (GR). After extensive research and stringent biosafety process, it was approved as NSIC 2022 Rc 682GR2E, with a popular name of Malusog Rice (MR). To reach the local vulnerable populations, milled MR with total carotenoids ranging 3.21-5.20µg/g, were distributed to five provinces with high malnutrition and VAD. A hundred households from each province (2 municipalities; 4 barangays), with children aged 6-59 months or pregnant/ lactating women, were selected as recipients of 5kg MR. The consumer acceptability of this novel product was also determined by the household representatives who are usually mothers through sensory evaluation. Using a 9-point hedonic scale (1=dislike extremely to 9=like extremely), they assessed the aroma, color, and grain length/shape of raw rice, and aroma, color, taste, and tenderness of cooked rice. Overall acceptability was also determined. In all provinces, both the raw and cooked forms obtained a degree of liking of mostly 7=like moderately, 8=like very much, and 9=like extremely. Raw and cooked MR had the following overall acceptability: 100% and 100% (Quirino), 95% and 98% (Catanduanes), 99% and 99% (Antique), 98% and 99% (Samar), and 100% and 98% (Agusan del Sur). With the ability of MR to provide 30-50% of the estimated average requirement for vitamin A to the vulnerable populations and its overwhelming high consumer acceptability, it could indeed be an effective delivery vehicle for vitamin A to help combat VAD and improve the nutritional status in the country.

Keywords: Malusog Rice, beta-carotene, vitamin A deficiency, sensory evaluation, consumer acceptability

A closer look at low and medium-glycemic index rice: Evaluation of grain quality and pasting properties

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Glycemic index (GI) is a value used to measure how quickly a food can raise blood sugar (glucose). Regular consumption of foods with high-GI foods (70-100) increases the risks of cardiovascular diseases, type 2 diabetes, and obesity. This study evaluated various physicochemical properties (amylose content [AC], gel consistency [GC], gelatinization temperature [GT], hot water soluble [HWS] and insoluble [HWI] starch fractions) and pasting viscosity of low/medium-GI rice donors that can be used as indicators to select varieties/ breeding materials with low-GI. AC, HWS, and HWI starch fractions were analyzed using iodine colorimetric method. Pasting viscosities were measured using Rapid Visco Analyzer. GT and GC were determined using the protocol described in the National Cooperative Testing Manual for Rice. Compared with medium-GI rice donor, low-GI rice donor had higher AC, final viscosity, and HWI starch fraction, and lower breakdown viscosity. To identify potential low-GI rice from the Philippine approved varieties, the physicochemical and pasting properties of 19 high-AC rice varieties were analyzed and compared with that of the low-GI donor. Four approved rice varieties were comparable to the low-GI donor in terms of AC, breakdown viscosity, and HWI starch fractions. Generally, AC is the determinant of the eating and sensory qualities of cooked rice, however, there are rice varieties with similar AC but differ in their cooked rice texture. Such difference can be explained by the proportions of HWS and HWI starch fractions. The varieties with higher proportion of HWI starch fraction (long chain amylopectin) have rough and chewy texture, and less digestible cooked grains. Apparently, AC, breakdown viscosity, and HWI starch fractions could be used as possible indicators of low-GI rice. However, additional high-AC rice varieties and breeding lines and measurements of these parameters are recommended to further confirm the results.

Keywords: glycemic index, physicochemical properties, pasting properties, amylose content, starch fraction

Development of an infrared heating system for brown rice heat treatment and stabilization

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One high-quality rice product, in terms of human nutrition, is Brown Rice. Despite its advantages in terms of nutrition and milling recovery, the production, sale, and consumption of this commodity are rather limited. Another downside is its short shelf-life (2–3 months), which is attributed to the rapid reactions of the lipase enzyme, released from the breakup of the bran cells during the hulling process. This study aimed to prolong the shelf-life and preserve the quality of stored Brown Rice through infrared heat treatment by means of a pilot-scale infrared heating system (IHS). The fabrication and assembly of the IHS first prototype was completed in 2022. Its design featured a horizontal configuration with a grain hopper and a loader that evenly dispensed a thin layer of Brown Rice onto a food-grade conveyor belt, which moved the rice through a heating chamber consisting of a series of infrared ceramic heating panels situated above the belt. Heat treatment experiments using NSIC Rc 160 Brown Rice evaluated the performance of the IHS and determined its optimum settings. The independent variables were the temperature of the infrared heater (250°C, 300°C, 350°C), the distance of the heater from the conveyor belt (12.5cm, 17.5cm, and 22.5cm), and the time of exposure of the grains to infrared heat; and the linear speed of the conveyor belt (0.020, 0.023, 0.026 m/s), which influenced the duration of exposure of the grains to infrared heat (35, 31, 27 s, respectively). The dependent variables were grain throughput, moisture content reduction rate, and grain temperature after heat treatment. Results showed that drying time significantly affected the grain throughput or drying capacity of the machine; heater temperature and distance of the heater from the conveyor belt significantly influenced the grain temperature after heat treatment and the grain moisture reduction rate. Response surface analysis results showed that for optimum grain temperature after heat treatment (57.4°C), the settings for heater temperature, conveyor belt speed, and distance between heater and conveyor belt should be 350°C, 0.026m/s, and 22.5cm. For optimum grain moisture reduction rate (1.1 percentage points per minute), the settings should be 250°C, 0.02m/s, and 12.5cm. For optimum grain throughput (72.5 kg/h), the settings should be 250°C, 0.026m/s, and 12.5cm, and at this particular setting, the drying efficiency of the IHS was also determined to be highest at 47.6%. The IHS could still be improved by installing an accurate speed controller for the motor driving the conveyor belt and equipping the conveyor with a vibrating device to distribute the grains properly and uniformly on the conveyor belt. A storage experiment was started to evaluate the effects of infrared heat treatment on the physicochemical and shelf-life characteristics of Brown Rice.

Keywords: brown rice stabilization, infrared treatment, shelf-life

Development of a village-type brown rice machine and its deployment in selected regions

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Brown Rice (BR) is nutritionally superior to milled or white rice because of its higher amounts of nutrients, including fiber, protein, vitamins, minerals, and antioxidants. These health-promoting properties can help reduce the incidence of diabetes, cancer, and cardiovascular diseases. BR has also about 10% higher milling recovery than milled rice. However, the current consumption of BR is mostly limited to health-conscious individuals and high-income earners because it is relatively more expensive with limited availability and accessibility. To help address these concerns, PhilRice developed a village-type Brown Rice machine (BRM). After going through the machine development process, four working prototypes were deployed to selected cooperating users in the rice-based farming communities of Regions 2 (Isabela), 3 (Nueva Ecija), 6 (Negros Occidental), and 13 (Agusan del Sur). Design was refined based on the feedback during the two-year monitoring and evaluation. The refined village-type BRM design was composed of a dehulling unit (containing a pair of 8”x 4” rubber roll hullers) with a hopper, tray separator (with a mechanism to regulate the volume of mixture entering its two layers), conveyor, cyclone, and prime mover. A rotary-type adjustment was also provided for regulating the angle of inclination of the tray assembly. Said features were also integrated in a BRM that was designed to be retrofitted in an existing two-pass rice mill. Performance data showed BR production at 115-331kg/h with 71-77% recovery. Output is better, performance is enhanced, making it acceptable among the cooperating users and spurred interest among other members of the community organizations.

Keywords: Brown Rice, brown rice machine, village-type, capacity, recovery

Downscaling and automating flatbed paddy dryer for small-scale farmers in Camarines Norte

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The capacity of flatbed dryers distributed by the Department of Agriculture is way higher than the average harvest of smallholder farmers in Camarines Norte and in other parts of the country, leaving some of them unused and deteriorated over time. This research study modernized the design of a flatbed paddy dryer to optimize its full potential and viability, provide an effective moisture content detector and an efficient heat source, and consequently decrease the drying time while maintaining quality. The automated flatbed dryer (AFBD), with a capacity of up to 0.3 tons, obtains heated air from a furnace with an electrical coil as a heat source. It has a reliable moisture-based switch control system that ceases the drying operations when moisture content of 12.5±0.2 % is reached. It has a thermal efficiency of 74.1%, moisture removal rate of 2.99 kg/hr, and accomplished drying of palay with an initial moisture content of 21±0.5% (w.b.) in just five (5) hours. When dried palay from AFBD were milled, 67% head rice yield and 64% milling recovery were achieved, outperforming existing flatbed dryers and sun-drying. Also, the dryer had a cost-benefit ratio of 1.2, a payback period of 1.7 years, and a 59% return on investments in the first year, making it economically and financially viable for use in Camarines Norte. Given these features and performance, the AFBD offers potential for wide use by small-scale rice farmers in the province and potentially in other parts of the country.

Keywords: paddy drying, automated flatbed dryer, grain drying, small-scale farmers

Improving competitiveness using direct seeding technology in the PalaySikatan in Tabuk City, Kalinga

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DA-PhilRice Isabela

The goal of the Rice Competitiveness Enhancement Fund (RCEF) is 5t/ha yield and reduction of cost of production by 30% in 2025 through its four major component programs. Its seed component distributes inbred certified seeds. In the PalaySikatan project, recommended varieties and machines were showcased in the 42 RCEF provinces, one of which is Kalinga, the rice granary of the Cordilleras. The area is a wide plain and fully irrigated, where crop establishment is transplanting using 80kg seeds. With the increasing cost of fertilizer and labor, aggravated by labor scarcity, rice production has become grueling and costly. The PalaySikatan re-introduced the Direct-Seeded Rice (DSR) through simple equipment – the drum seeder and seed spreader – to alleviate problems on cost and labor. The two machines have been around for a while but there are technology diffusion challenges. Hence, knowledge-sharing and learning through technology demonstration was used to create awareness and ignite interest of farmer-participants. The farmers learned how to utilize simple equipment that could enhance their DSR practice including the 40kg/ha seeding rate. From the initial two techno-demo sites of 3ha in DS2021, they grew to 12ha in DS 2023. The rapid adoption of farmers from the method demonstrations prompted the LGU of Tabuk City to procure the machines, even as many farmers bought their own. Based on the monitoring of FCAs provided with the equipment, 15 farmers planting 77 ha continuously used the machines excluding those who bought their own and were not included in the monitoring. Yield levels increased up to 9.02t/ha with an average 5.89t/ha in farmers' fields. Shifting to DSR also reduced cost in crop establishment by ₱1,600/ha which could contribute to a 3% reduction in production cost. Also, the use of DSR equipment eased the scarcity of labor resulting in timely planting.

Keywords: RCEF Seeds-Techno-demo, drum seeder demonstration, direct seeding technology

Technical field evaluation of a knapsack-type seeding machine at different seeding rates for rice (*Oryza sativa*) production

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DA-RFO VI Research Division

A knapsack-type seeding machine was recently introduced by the DA to farmers' cooperatives and associations to be used in rice production. In this way, lesser rice seed input will be needed, at the same time, less expensive and simple to operate. Even though the numerous advantages and benefits of using knapsack-type seeding machine have been observed by the users, its effectiveness has not been established at different seeding rates and its effect on the production yield of commonly used lowland rice varieties. Its technical field evaluation aimed to increase rice production by reducing seed inputs through the adoption of the seeding machine. It was conducted under a lowland irrigated rice ecosystem and evaluated using RCBD with 3 treatments (60kg/ha, 80kg/ha, and 120kg/ha) with 3 replications and analyzed using Analysis of Variance to determine the seeded crop's growth performance in terms of tiller production, plant density, and yield. Based on the results of the study after two cropping years including two wet and dry cropping seasons each, the plant density of 120kg/ha seeding rate is significantly higher compared to other treatments. However, it has been observed that the denser the plant population, the fewer productive tillers developed. Overcrowding of seedlings during vegetative stage inhibits the development of more tillers as the hills are closely spaced from each other. In terms of yield, there is no significant difference among treatments, hence the 60kg/ha seeding rate can be recommended to reduce seed input for lower input cost and higher net income. Apart from being utilized as crop establishment equipment, the machine has also been effective and efficient in applying fertilizers, herbicides, and pesticides in either granular or liquid form. Its main advantages are: economical as it requires lesser seed input with a maximum of 68.25% reduction, simple-to-operate, efficient and effective as it distributes the inputs uniformly across the field and minimizes damages from birds and rats as it broadcasts the seeds with ample force below the soil surface. Proper trainings shall be carried out for beneficiaries to effectively operate the machine with discharge chute setting at no. 1 with an average operating speed of 43.66 m/min; and at no. 2 with 44.25m/min for 60kg/ha and 80-120kg/ha seeding rates, respectively.

Keywords: seeding rate, knapsack-type, tillers, plant density, yield

Impact assessment of agricultural mechanization in Camarines Norte

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This study examined the impact of agricultural mechanization on rice, coconut, and pineapple in Camarines Norte. The analysis of research findings involved the utilization of primary and secondary data from reliable sources, i.e., farmers, Philippine Statistics Authority (PSA), and the Office of the Provincial Agriculturist-Camarines Norte (OPAG-CN). The study found that farmers in the area were typically older and considered marginal farmers due to their limited land ownership, educational attainment, and financial capability. Most individuals had completed their secondary education. The cultivation of coconut and pineapple, as well as rice, was predominantly dependent on manual labor and the use of hand tools. The impact of agri- mechanization on marginal farmers is associated with reduced income and the need to explore alternative sources of livelihood. The introduction of agri-mechanization technologies (agricultural tractor, combine harvester, and others) has led to improvements in rice production in the province. These technologies have resulted in the production of better-quality rice at reduced labor requirements and costs, and in the improvement of input-use efficiency, leading to more satisfied users. Small-scale farmers, on the other hand, continue to rely on traditional farming methods as they lack access to agricultural machinery that is appropriate for their production needs. The F2C2 is one of the best strategy to address this issue.

Keywords: rice farmers, impact of Agricultural Mechanization, rice production, Agricultural machinery, Age of farmers

Comparative study on productivity and profitability of inbred lowland rice *(Oryza sativa* L.*)* using different crop establishment methods

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Rice production practices have been continually changing due to new technologies and government programs that evolve to meet the dynamic challenges and needs of Filipinos. As manual transplanting requires high labor, the mechanical transplanter and knapsack-type seeding machine were developed. However, manual broadcasting or line-seeding of pre-germinated seeds on wet soils have been increasingly adopted by farmers. This study determined the most profitable method of obtaining optimum rice growth and potential yield. It consisted of: mechanical and manual transplanting; and mechanical and manual direct seeding. Each treatment utilized 0.25ha, replicated thrice for wet and dry cropping seasons under the irrigated lowland ecosystem. Results showed that mechanical transplanting produced the highest number of productive tillers (23), plant height (109.06cm), and weight of 1000 grains (25.02g); manual direct seeding had the lowest. In four cropping seasons, mechanical transplanting had the highest yield (5.27 t/ha) because seedlings are ensured with adequate plant spacing and root anchorage resulting in better tillering behavior and shorter transplanting shock period. Lowest yield was observed in manual direct seeding (4.47 t/ha) due to competition in nutrient intake resulting in fewer productive tillers (17). Minimum labor requirement and decrease in seed input through mechanical direct seeding using knapsack-type seeding machine resulted in highest return of investment (64.05%). Mechanical transplanting is recommended to seed growers for easier and faster operation, which reduces drudgery, less labor requirement, and addresses labor scarcity. Timely crop establishment and mechanization helped increase farmers' income by 62.55 to 64.05%.

Keywords: mechanical and manual transplanting, direct seeding, return of investment, crop establishment methods

The Tarriela technique in rice seedling preparation

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Mario Tarriela of Lubang Island in Mindoro Occidental developed a technique in seedling preparation that departs from the conventional practice. This technique prevents damage and wastage of seeds and materials thus reducing costs. This makes use of reusable seedling trays (thin PET is preferred) rather than seedbeds, relieving the farmer from the attendant tasks and costs of seedbed preparation, application of molluscicide and herbicide, and uprooting. Optimum care can be done effectively within the confines of the farmer's home or other secure areas to protect the seedlings from damage due to inclement weather, birds and other animals. In the Tarriela Technique, mud is thinly applied over the tray's surface and the germinating seeds are compacted with the use of a flat board for about 30 seconds twice a day for three consecutive days. This prevents root entanglement and allows easier picking of seedlings for manual transplanting. With the seedling mesh lighter and mud-free, it is easier to feed the seedlings into the mechanical transplanter leading to an amazing 95% seeding success rate. Thick mud is not applied on the tray because it can be a precursor of disease and uneven growth. Mud may not be easy to obtain and sometimes must be bought. Only a thin film is needed for the seeds to be sprinkled upon. Transporting the seedling trays is convenient through a carrier that protects the seedlings from damage and stress.

Keywords: seedling preparation, convenient, cost-effective

THEME 3: Farmer-Entrepreneurs in the Rice Value Chain

Heat recovery from carbonizer attachments for food processing: Additional source of income in rice-based farming communities

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Carbonized rice hull (CRH) is an effective soil conditioner. The PhilRice-developed continuous-type rice hull carbonizer is very efficient in producing CRH. In the process, heat is generated but it just dissipates and gets wasted, hence ovens were developed as attachments. To evaluate their application in food processing, they were utilized in drying fish (cubical-type oven) and roasting chicken and pork belly (cylindrical-type). Thermocouple wires were used to monitor oven temperature, and quality of the finished products was evaluated. Fish drying was completed in 4h at 102-119°C temperature. The product had 154.1% dehydration rate, 0.835 water activity, and pH of 6.56, with the following proximate composition: 4.2% moisture content, 37.8% crude protein, 11.4% crude ash, 23.9% crude fat, 0.7% crude fiber, and 22.8% carbohydrates. It also had low microbial count. The roasted chicken had acceptable color, overall appearance, aroma, doneness, and tenderness, with overall acceptability of 7.1 (like moderately). It had 5.6% MC, 64.0% CP, 6.0% CA, 16.4% CF, 5.9% crude fiber, and 9.0% carbohydrates. The pork belly had high sensory scores for internal color, aroma, doneness, and taste/flavor. Its proximate composition: 5.8% MC, 62.8% CP, 7.2% CA, 17.9% CF, 4.7% crude fiber, and 1.5% carbohydrates. This study clearly indicates that both types of oven could effectively recover the heat generated from CRH production for food processing applications. The creative use of the carbonizer attachments in value-adding can be an additional source of income.

Keywords: carbonizer, heat recovery, cubical-type oven, cylindrical-type oven, food processing

Upscaling and commercialization of DA-CVRC-developed Brown Rice food products in Cagayan Valley Region

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In 2018, DA-CVRC initiated R&D on various Brown Rice-based food products in support of the annual celebration of the National Rice Awareness Month, and to heighten Brown Rice consumption, promote consumer awareness, and capture the taste buds of youngsters and dieters. Among the products developed under the trademark "Nana Oryza Rice Delicacies" were puffed rice, cookies, flour, and Panderice (pandesal blended with brown rice flour). To upscale and commercialize these food products, we partnered with the Lucban Small Water Irrigation System Association (SWISA) in Benito Soliven, Isabela. We capacitated them with actual food processing activities and trainings on Good Manufacturing Practices and Food Safety, Personal Entrepreneurial Development, Basic Business Functions, Processes and Planning, and PhilGEPS Application. A starter kit in the form of basic processing equipment, supplies, and materials was awarded to the association. Market-matching and linking of these products were pursued to make them available in local stores, pasalubong centers, convenience stores, supermarkets, KADIWA outlets, advertisement through social networking sites, and exhibit displays. With this, the project is continuously expanding through the growing number of technology adopters from cooperatives and small entrepreneurs in Cagayan Valley. With growing awareness and demand for the food products, business support was granted to the partner-association through the DA Rice Program, BP2 Program, DTI, and FDA. The products are now showcased in all gatherings, product exhibitions, and pitching participated in by the association. The growing number of interested farmer-cooperatives/associations (FCAs) and private business entities is a manifestation that Brown Rice food products will have a niche in the national market. Increasing health consciousness may also propel consumers to shift to healthy food options.

Keywords: Brown Rice, Brown Rice-based products, business support, commercialization, upscaling

From farmers to entrepreneurs: Analyzing the entrepreneurial readiness of farmer cooperatives and associations in Sariaya and Tiaong, Quezon

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This study examines the entrepreneurial readiness of farmer cooperatives and associations (FCA) in Sariaya and Tiaong, Quezon, under the Rice Business Innovations System 2.0. Understanding their business capacity is critical in formulating targeted inventions and support that will facilitate their engagement in sustainable agro-entrepreneurship. The business capacity assessment involved 175 participants from 14 FCAs, who were beneficiaries of RiceBIS 1.0. A Focus Group Discussion (FGD) was carried out using a standardized tool and SWOT analysis to evaluate the FCAs' capacity and readiness for agro-entrepreneurship. The findings revealed that only one cooperative in Sariaya demonstrated high capacity and a strong inclination toward agro-entrepreneurship; eight associations displayed medium capacity; and five exhibited low capacity. The SWOT analysis identified key factors manifesting readiness. Strengths included united and active members, effective utilization of farm machinery, ample leadership training, competent leadership, and productive partnerships with technicians. Weaknesses encompassed limited capital, income diversification constraints, post-harvest facility shortages, risk-averse behavior, reliance on external traders, non-operational machinery, and diminished farmer motivation. Opportunities were increasing machinery demand, government support, and access to small-scale machinery. Threats included low farmgate prices, high input and labor costs, trader price dominance, irrigation inadequacies, and the presence of pests and natural calamities. In conclusion, the study found that 13 of the 14 associations require substantial support, particularly in rice production. To energize the medium- and low-capacity FCAs, farm clustering is recommended whereby nearby FCAs are grouped to promote collaboration, resource-sharing, and knowledge exchange. Additional recommendations include: 1) securing government support through agricultural technician partnerships; 2) advocating for local policies to address issues such as irrigation, low fresh palay prices, high input costs, pest control, and calamities; 3) acquiring machinery for mechanization and income diversification; 4) providing comprehensive training in technical and entrepreneurial aspects; and 5) strengthening market research and institutional collaborations to facilitate the transition to agro-entrepreneurship.

Keywords: agro-entrepreneurship, entrepreneurship, farmers' readiness, farm clustering, business capacity assessment

THEME 4: Digital Transformation

Rice Development Intervention Monitoring System (RiceDIMS): A guide for rice R4D deployment

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In 2019, the RCEF paved the way for the nation's rice industry to be competitive. Several interventions are being provided to farmers such as high-quality seeds, financial assistance, extension services, and machines. With numerous interventions already delivered, plus a couple more in the offing, the creation of an online monitoring system is deemed necessary. In 2021, through th0e project *Scaling Rice Development Initiatives in Central Luzon (SRDI in CL)*, the Rice Development Interventions Monitoring System (RiceDIMS) was crafted. RiceDIMS is a system designed to monitor all rice development interventions delivered and ongoing within the areas of responsibilities of DA-PhilRice Central Experiment Station. Specifically, it was designed for storing, mapping, and easy access of rice development interventions such as production support, extension services, machinery and equipment, facilities and infrastructure, and financial support, as well as the profile of the LGU and agricultural extension workers. Initially, the RiceDIMS operates in partnership with the 7 provincial LGUs and 130 city/municipal LGUs in the region that serve as the main source of the required data on rice interventions delivered in their respective area of responsibility. The system's deployment is expected to enhance the decision-making capacity of policymakers, local chief executives, agency heads, and other rice development intervention providers. Through the system, strategic positioning of interventions will be achieved and resources optimized. As a result of the post-system deployment survey, respondents find the system useful for rice development intervention implementers and local chief executives at 57.69% and 53.57%, respectively.

Keywords: *RiceDIMS, interventions, partners, development, digital tool, digital transformation*

An Automated Irrigation System (AIS) that improved water productivity and yield of rice

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The Automated Irrigation System (AIS) is an alternative method of irrigation that controls water flow within the paddy without human intervention. It is composed of the following components: a steel gate with actuator, an observation well with sensor, and a controller with Auto-AWD program. The well was installed at the experimental field and it transmitted data to the controller. The opening of the gate was initiated when the water at the well was zero; and the gate was closed if the water level in the well was 20 cm during the dry season and 25 cm during the wet season. The system was evaluated at the PhilRice REMD Farm during the 2022 DS. Comparison of AIS in terms of water input and productivity, and actual yield both for continuous flooding (CF) and AWD with NSIC Rc222 as the test variety was evaluated. Results show that the water input of CF was 437.98 mm, which is significantly higher than the AWD and AIS of 348.94 mm and 341.24 mm, respectively. Water productivity of the CF was 1.74 kg/m^3, which is lower than the AWD and AIS of 2.31 and 2.38 kg/m^3, respectively. Furthermore, the yields for manual and Auto-AWD were slightly higher than the non-AWD. The average yields for AWD and AIS were 8.05 and 8.06 t/ha, respectively, while yield in CF was 7.65 t/ha. Irrigation using the AIS method resulted in a water saving of 22% compared to CF, and 20% with AWD compared to CF. This study proved that automation of the irrigation process in rice production could facilitate efficient irrigation management and reduce water-use without penalty on grain yield.

Keywords: Automated irrigation, auto-AWD, water-saving, water sensors

Monitoring the Flatbed Dryer Operations through Internet of Things

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Proper drying of rice seeds is important for the preservation of seed quality. While mechanical flatbed-drying provides an economical alternative to sun-drying mainly because of the ability to operate straight 24h in a day, continuous monitoring of the drying air temperatures to guide the operation remains a challenge. This study aimed to create an IoT (internet of things) system that can simultaneously monitor the drying air temperatures of several reversible flatbed dryers. Three ESP32 microcontroller-based devices were developed for temperature measurements using semiconductor DS18B20 sensors inserted into the bottom plenum and top headspace of the three eight-ton reversible airflow flatbed dryers of BDD on April 13-21, 2023. With measurement intervals set at 10s, the individual data were transmitted through a WiFi access point, to a data server at the PhilRice Information Systems Division (ISD). Some series of monitoring runs revealed that air temperatures often exceeded the maximum allowable temperature of 43°C for rice seeds, which could have been deleterious to seed quality. This observation was found primarily due to the process of manually operating the rice husk biomass furnaces. Significant improvements to their design and operation were recommended.

Keywords:

THEME 5: Extension Support, Education, and Training Services (ESETS)

Adaptability and yield performance of selected newly released inbred rice varieties in PhilRice's on-station and on-farm techno-demo farms: a four-season analysis

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Every year, new rice varieties are released for national/regional adoption to help address production problems and the changing climate. As it is vital to identify their location-specific performances for proper positioning and adoption, all PhilRice stations carried out the techno-demo and learning farm (TDLF) project to evaluate the adaptability and performance of newly released varieties, and identify best adapted and preferred varieties of farmers nationwide. Popular/farmers' preferred varieties were showcased in 34 locations during the dry seasons of 2022 and 2023, and in 38 locations during wet seasons of 2021 and 2022. The new varieties (NSIC Rc 480, Rc 506, Rc 508, Rc 510, Rc 512, and Rc 534) obtained similar average yields ranging from 4.71 to 5.54t/ha (on-farm TDLF) and from 4.71 to 5.3t/ha (on-station TDLF) for four seasons. NSIC Rc 512 averaged highest (5.54t/ha) in the OFTDLF while Rc 506 (5.3t/ha) stood out in the OSTDLF. Rc 512 also averaged highest for WS (5.17t/ha) and DS (5.91t/ha) across locations. Some varieties (Rc 508/512) released nationally and for Luzon recorded low yields in Agusan Del Sur and North Cotabato. NSIC Rc 506 released for the Visayas performed very well in Luzon particularly at PhilRice CES with 9.36t/ha yield during the 2022 DS and in Tiwi, Albay with 8.6t/ha during the 2023 DS. The rainfed variety Rc 480 and saline-tolerant Rc 534 also performed well in irrigated areas at 1.5 to 2t/ha greater than their average yields of 3.2 and 3.1t/ha, respectively. These adaptation patterns and yield performances will play a great role in the proper positioning of these varieties to increase their adoption.

Keywords: Adaptability trials, technology demonstration farms, varietal demonstration, newly released rice varieties

RCEF Training of Trainers on Pest and Nutrient Management: Evidence of training effectiveness from selected participants

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This study determined the effectiveness of the RCEF Training of Trainers on Pest and Nutrient Management (TOT-PNM) among its graduates in terms of gain-in-knowledge (GIK), changes in farming practices, confidence in sharing PNM technologies, behavioral changes in the work environment, and the conduct of training activities by the graduates. It also investigated the relationship between farming and training experiences and GIK. An online survey involved 236 TOT-PNM graduates from May 2021 to June 2022, using descriptive and inferential statistics. Results showed that graduates from Farm Schools or Learning Sites for Agriculture (FS/LSA) and Municipal/Provincial-LGU (M/P-LGU) are younger (18 to 30 years old). Majority of the graduates from FS/LSA had non-agriculture courses as educational background but had more farming experience (more than 6 years) compared to most of the M/P-LGU participants. Graduates with non-agriculture background had higher GIK, while those having longer farming and extension experience had lower GIK, as evidenced by a weak negative correlation using Spearman Rho Correlation. Some (33.47%) of the respondents changed their farming practices after the training. Overall, the training program enhanced the respondents' confidence to serve as resource person, facilitator, and training coordinator. Consequently, more than half (55%) of the TOT-PNM graduates later served in training activities in said capacities, and a third (31%) were consulted for technical advice. Their involvement in PNM-related trainings was influenced by factors such as educational attainment and background, farming experience, and work affiliation.

Keywords: gain in knowledge, pest and nutrient management training, training of trainers

Effectiveness of Training of Trainers on Production of High-Quality Inbred Rice Seeds and Farm Mechanization in Palawan: Exploring the relationship between sex, age, and educational attainment and gain in knowledge of training participants

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Under the Rice Tariffication Law, PhilRice is designated to train agricultural extension workers (AEWs); trainers of Learning Sites in Agriculture (LSAs) offering Farmers Field School (FFS) for rice; and farmers on rice production, and other specialized courses. This study evaluated the effectiveness of the training of trainers (TOT) on high-quality inbred rice seeds and farm mechanization on the knowledge level of 65 participants across Palawan composed of AEWs from local government units (LGUs) and LSAs. The training course employed a combination of participatory lecture-discussion and interactive learning sessions that engaged participants and made the learning process more effective. The topics covered the complete rice production operations, including lectures on rice morphology and growth stages, an overview of the PalayCheck System, special topics pertaining to pest and nutrient management, and rice machinery operations. Field and hands-on activities were also included such as the agro-ecosystem analysis (AESA), roguing, germination and varietal purity testing, and farm machinery operation. The knowledge level of the participants was measured by the scores they obtained during the pre- and post-tests administered before and after the training. The result showed a significant gain in knowledge (GIK) level averaging at 59.64%. Sex, age, and educational attainment did not affect the participants' GIK. In conclusion, the training produced significant effects on the knowledge level of the AEWs.

Keywords: Training, gain in knowledge, PalayCheck

Bringing rainfed lowland rice varieties to rainfed lowland farmers: A UPLB RVIT-Lopez, Quezon Partnership

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Lopez, Quezon holds a significant position in the rice production landscape of CALABARZON. Here, small-scale rice farmers are key contributors to the region's overall rice production in both irrigated and rainfed environments. However, rainfed lowland rice farmers often have limited varietal choices. Varieties availed through the RCEF-Seed Program may not always match the production environment. Thus, the UPLB Rice Varietal Improvement Team (RVIT) partnered with LGU-Lopez rainfed lowland rice farmers to 1) describe local rainfed lowland rice-farming practices to guide variety selection, and 2) conduct farm demonstrations of five UPLB-bred rainfed lowland rice varieties (NSIC Rc282, Rc286, Rc418, Rc476, and Rc596) using local production practices to expand the range of suitable variety choices. Local practices on seed/variety use, land preparation, crop establishment, transplanting, fertilizer use, pest management, and harvesting were described in a focus group discussion (FGD) with 11 collaborating rice farmers in barangay Rizal. Variety choice was based on field performance and taste, which aligned with local farmers' production goals of low external input production and home consumption. Resistance to pests and diseases, tolerance to drought, long and dense panicles, and the desired soft and sticky eating quality were the key traits considered. Thus, a similar participatory strategy that enables farmers to gain experience with more NSIC-released varieties on a 'farm test' scale may lead to a more responsive seed system – addressing the unique needs of farmers in rainfed lowland environment in this case, while increasing utilization of products from rice breeding.

Keywords: rainfed lowland rice; UPLB rice varietal improvement; Lopez, Quezon

Beyond awareness: Technology adoption among farmers thru the use of strategic communication interventions under the Rice Competitiveness Enhancement Fund Program

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The Rice Tariffication Law created the Rice Competitiveness Enhancement Fund (RCEF) to improve rice farmers' competitiveness and income. One of the key programs of RCEF is the Rice Extension Service that provides extension services to sharpen the capabilities of RCEF beneficiaries in using yield-enhancing and cost-reducing technologies. In its fifth year of implementation, the effectiveness of the strategic communication support in influencing the behavior of beneficiaries was assessed, beyond increasing their knowledge, influencing their positive attitude, and developing their intention to act. Focus group discussions were conducted among 209 beneficiaries in Nueva Vizcaya, Pampanga, Quezon, Antique, Bohol, Agusan del Sur, Davao del Sur, Zamboanga del Sur, and Maguindanao. Data was subjected to thematic analysis. Among the strategic communication interventions used by RCEF, farmer-adopters mostly learned the technologies from printed materials. Other farmers learned from school-on-the-air, face-to-face activities, and social media. Crop establishment and nutrient management technologies were mostly adopted. Other farmers adopted land preparation and pest management. Farmer-adopters had also attended training or knowledge-sharing and learning (KSL) activities. Printed materials, KSL activities, and social media were effective in influencing the behavior of rice farmers toward technology adoption. It is recommended that communication interventions be complemented with training activities to be more effective in influencing technology adoption among farmers.

Keywords: technology adoption, RCEF Program, strategic communication interventions

Enabling rice trainers and farmers as extension intermediaries

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DA-PhilRice Isabela

One of the components of the RCEF-RESP is training. From 2019 to 2023, PhilRice Isabela has implemented two (2) batches of Rice Specialists' Training Course (RSTC); five (5) Training of Trainers on the Production of High-Quality Inbred Rice and Seeds, and Farm Mechanization; 19 TOT on Pest and Nutrient Management (PNM), 3 Short Course on Pest and Nutrient Management (SC on PNM); and 3 Farmers' Field School (FFS) on the Production of High-Quality Inbred Rice, Seed Certification, and Farm Mechanization. The station trained 911 RCEF graduates for RSTC (59), TOT on HQ (135), TOT on PNM (527), SC on PNM (94), and FFS (96). The success of the training is measured in their knowledge gain (GIK). On average, the GIK of RSTC graduates is 57%, 68% for TOT on HQ, 61% for TOT on PNM, 39% for SC on PNM, and 47% for FFS graduates. A paired sample t-test was performed to compare the cores of RCEF trainees. There were significant differences in scores between pre-test (M=28.33, SD=14.90) and post-test (M=94.67, SD=19.37) for TOT on HQ; pre-test (M=20.37, SD=11.31) and post-test (M=51.73, SD=12.40) for TOT on PNM; pre-test (M=20.41, SD=7.06) and post-test (M=33.99, SD=5.56), for Short Course on PNM; pre-test (M=67, SD=28.57) and post-test (M=164.69, SD=23.28) for RSTC; and pre-test (M=10.57, SD=3.36) and post-test (M=16.47, SD=3.42) for FFS. These trainings aim to improve their knowledge and skills in managing rice fields especially in properly diagnosing problems related to pest and nutrient management. Generally, the adjectival rating across all trainings is excellent. The graduates of RCEF-Training are expected to share the knowledge and skills from the latest best practices and technologies in rice farming in their respective communities. Their learning will help in increasing the yield and quality of rice.

Keywords: RCEF-RESP, Training Component, pest and nutrient management

Impact of PalayCheck-based Short Course on Pest and Nutrient Management on the knowledge level of CALABARZON and MIMAROPA farmers

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To complement PhilRice-RCEF's seed distribution program, farmer-beneficiaries need to be equipped with technologies to improve their rice productivity. This research assessed the impact of a short course on pest and nutrient management on the agricultural knowledge of rice farmers. Eight training sessions were carried out across Cavite, Laguna, Batangas, Rizal, Quezon, Mindoro Oriental/Occidental, and Palawan. All sessions were led by the same training team and invited resource lecturers. Participants were 208 farmer-recipients of RCEF seed distribution program. The short course employed participatory lecture-discussions on varied rice and rice-related topics, spiced up with practical field activities. The training design also ensured that participants can maximize knowledge-sharing and learning. To assess the change in the farmer-beneficiaries' knowledge levels, pre-tests and post tests were administered. Results of the study revealed a significant gain in knowledge level of the farmers following the training ($t = 30.69$, $p = 0.000$) using paired t-test. On average, the knowledge improvement attributable to the short course was 48.32%. Factors such as gender, age, and educational attainment were determined to have no significant effect on their percentage change in knowledge. In summary, the study's findings suggest that the short course focused on pest and nutrient management had a significant and positive influence on the farmers' knowledge levels.

Keywords: Training, knowledge level, PalayCheck, keycheck

Scaling out rice nutrient decision support tools in Quezon: Emerging impacts on productivity, profitability, and technology adoption

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With the soaring prices of fertilizers, it was critical for farmers to ensure cost-efficient and -effective operations. The 2021-2023 study addressed the main concern for Quezon province to increase and sustain its productivity, cost-effectiveness, and profitability in rice farming. Nutrient management technology-scaling activities including farmers' capability training; technology demonstration; Lakbay Palay; agro-climatic characterization and rice suitability analysis; pre- and post-assessment surveys; and presentation of the tech-scaling results to the LGU and rice stakeholders were conducted in the nine major rice-growing municipalities of Quezon. These were accomplished in partnership with 19 P/MLGUs, DA-attached agencies, and farm schools. Notably, the 12 farmer-managed techno-demos highlighting the options of using either Minus-One-Element Technique (MOET) with Leaf Color Chart (LCC) or Rice Crop Manager (RCM) for nutrient recommendations have led to yield increases of 0.3 to 3 t/ha from the farmers' previous yields resulting in 5-7 t/ha yield ranges. This translated to a remarkable 20-70% increase in farmers' net income. Furthermore, 420 farmers have been reached through trainings and Lakbay Palay activities. However, there was a low technology adoption rate of 25.6%, wherein only 51 out of 199 farmers trained have adopted at least one of the nutrient decision support tools. Some reasons identified include farmers' preference of using their traditional practice in nutrient management, low purchasing power, timing of the conduct of trainings with respect to their planting calendar, and postponement of the application of the nutrient decision-support tools for the succeeding planting seasons. Other issues and constraints for sustaining high yields in Quezon include insufficient water supply, drought or flood stresses, salinity, pest infestation, and high risk for natural hazards as influenced by its geographical position. It is therefore critical that continuous efforts be exerted by the P/MLGUs with the support of rice stakeholders to further scale out the nutrient and other rice production technologies through policies, campaigns, and programs for increased technology adoption.

Keywords: nutrient management, technology adoption, Quezon, rice suitability analysis, technology-scaling

Assessing yield performance and farmer preferences for inbred and hybrid rice varieties recommended in Laguna

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The varietal demonstration of recommended inbred (popular and new) and public hybrid varieties to farmers including seed growers and extension workers is vital for showcasing the yield performances toward increased adoption. The study was conducted across municipalities in Laguna for three dry and three wet seasons from 2021-2022, particularly in a PhilRice-managed field in Los Baños and in farmer-managed fields in Los Baños, Bay, Pila, and Victoria. The varieties showcased – NSIC Rc508, Rc216, Rc436, Rc506, Rc480, Rc510, Rc512, and Rc218 (inbred), and M20 and M73 (hybrid) – were grown in a minimum area of 200 m^2. The rice production was managed according to the recommendations of the PalayCheck System and the fertilization rates were based on the Minus-One-Element Technique and Leaf Color Chart. The crop stand during the harvesting stage was demonstrated to the farmers in the locality in partnership with the local government unit and farm schools through a Lakbay Palay. Yields varied across locations, cropping seasons, soil types, and varieties. The crop performance was also influenced by weather, pest incidence and natural calamities such as typhoons and floods. A total of 276 farmers and rice stakeholders joined the Lakbay Palay wherein they were requested to vote for their top three choice of varieties. Farmer preferences are influenced by various factors such as plant height and stature, panicle number and length, and grain weight. NSIC Rc216 emerged as the top preferred variety during the wet season in 2021 and 2022 across municipalities where technology demonstrations were conducted. Other preferred varieties include NSIC Rc512, Rc508, and M73.

Keywords: Varietal Performance, Farmer Preferences, inbred varieties, hybrid varieties, grain yield, cropping season, Lakbay Palay

Monitoring and evaluation of RCEF PalaySikatan technology demonstration sites

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The PalaySikatan Technology Demonstration sites, established across 42 RCEF provinces, aim to enhance farmer productivity by demonstrating mechanized farming and location-specific technology packages alongside high-quality inbred seeds from the seed program. To evaluate the impact of RCEF PalaySikatan, a monitoring and evaluation component collected data from farmer-cooperators before and after their participation. Data were gathered from 2023 DS farmer-cooperators chosen through site validation by RCEF – Field Operations and Monitoring Division. Phone surveys with e-questionnaires covered 2022 DS for baseline information, while face-to-face interviews conducted by Techno Demo Officers (TDOs) collected 2023 DS data on socio-demographic characteristics, production, input use, and production costs from 513 farmer-cooperators. Key findings show that adopting the PalaySikatan technology led to significant improvements. Seeding rates decreased from 54 kg/ha (52 kg/ha for TPR and 57 kg/ha for DSR) in 2022 DS to the recommended 40 kg/ha in 2023 DS, and yield levels rose from 4.88 to 5.32 t/ha. NPK rates increased due to MOET recommendations, from 24-8-81 kg/ha to 42-10-104, contributing to higher yields. The cost and returns analysis indicated that farmer-cooperators achieved better returns in PalaySikatan due to increased yields and palay prices. Reduced seed costs and higher fertilizer costs due to increased rates and prices were observed. Adoption of mechanized transplanters and seeders decreased crop establishment costs, but harvesting and threshing costs were higher, despite the use of combine harvesters, due to the sharing arrangements. Cash costs increased from ₱9.75 to ₱9.89/kg in 2023 DS, yet farmer-cooperators still generated higher net returns under PalaySikatan. PalaySikatan has proven to be effective in enhancing farmer productivity through the adoption of mechanized farming technologies and recommended rice farming practices in conjunction with quality inbred seeds from RCEF. These findings emphasize the significance of technology-driven interventions in rice farming and their potential to make a substantial impact on farmers' livelihoods and the whole rice industry at large.

Keywords: RCEF, M&E, PalaySikatan, mechanization, Seed Program

Technology scaling model for sustainable hybrid rice production in Apayao, Isabela, and Abra

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In pursuit of rice security, local expansion of hybrid rice seed production and cultivation is among the strategies implemented by the Department of Agriculture. Studies have shown that hybrid rice can increase yields by 15%-30%. For a sustainable local hybrid rice production, a hybrid rice technology scaling model was developed and implemented in the provinces of Apayao, Abra, and Isabela. The model integrated the conduct of season-long training and establishment of adaptability trials on public hybrid rice seed production and F1 cultivation, development of local rice development plan, accreditation of trained farmers as seed growers, F1 cultivation, seed production, and the marketing of farmers' produce.

Throughout the project, 107 farmers received training in AxR seed production, while 124 farmers were trained in F1 cultivation. The establishment of adaptability trials for public hybrid rice seed production indicated an average yield of 216 kg/ha across three sites. In F1 cultivation, farmers achieved an average yield of 5.53t/ha during the Dry Season (DS) and 4.33t/ha during the Wet Season (WS). This resulted in a yield increment of 0.93t/ha and 0.24t/ha respectively, compared to the baseline data, across the three sites. The project's objective also involved persuading inbred rice farmers to transition to cultivating F1 hybrid rice. The findings revealed that farmers who shifted from using inbred to hybrid rice experienced a yield increase ranging from 1.2 to 3.9t/ha in DS and from 1.1t/ha to 3.5t/ha in WS. Additionally, these farmers observed a 13.6% to 31.1% increase in income during DS and a 6.5% to 100.3% increase in WS after switching from inbred to hybrid rice cultivation. Currently, three Local Government Unit (LGU)-led rice development plans have been formulated and advocated for, supported by signed Memorandum of Agreements involving partner agencies and various stakeholders. This particular model is aimed at tackling concerns related to the local production of hybrid rice seeds within the area. The LGU procures F1 seeds from seed growers and distributes them to farmers in the municipality. This approach ensures that both men and women stakeholders have consistent and equitable access to affordable and available seeds, thereby ensuring accessibility for all.

Keywords: hybrid rice seed production, F1 cultivation, technology scaling model

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