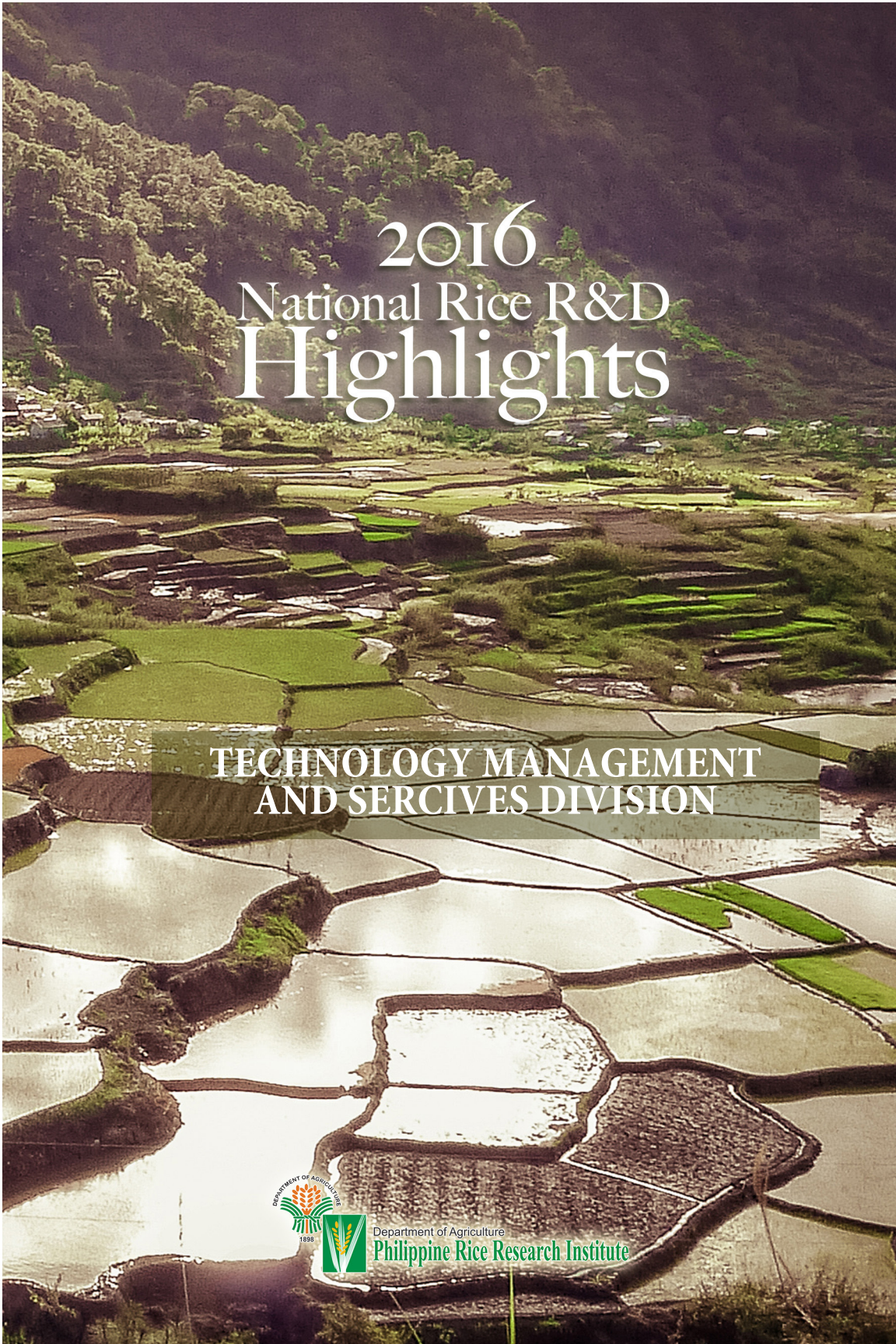

2016 National Rice R&D Highlights

TECHNOLOGY MANAGEMENT AND SERCIVES DIVISION

Department of Agriculture
Philippine Rice Research Institute

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Technology Management and Services Division

Division Head: Aurora M. Corales

Executive Summary

The Technology Management and Services Division (TMSD) is directly under the Office of the Deputy Executive Director for Development (ODEDD) which promotes/disseminates PhilRice developed technologies through science-based training and technology promotion models, to help increase the productivity and income of the rice farmers in the country. Likewise, the division enhances capacities of agricultural extension workers and other development catalysts from the government and private sectors through season-long/short-term training courses and rice science and technology updates.

This year (2016), five major core projects with seven studies and 11 externally-funded projects are being implemented by TMSD in support of the Institute's goals and objectives. The division draws attention in facilitating the dissemination and adoption of high yielding technologies, coupled with strategic components and strategies that reach more than 4,000 farmer leaders, extension workers, and other development stakeholders as beneficiaries of various projects handled by the division nationwide. Through the concerted effort of the division management staff and other project partners, 19 short-term training courses, 27 technical briefings/technology updates, and 22 season-long training courses were conducted and implemented this year. A total of 137 Technology demonstrations of best farming practices were carried-out on actual farms of identified farmer- cooperators from different project sites to strengthen the development of extension systems showcasing new technologies, integrated and diversified rice-based production systems.

To ensure the relevance, appropriateness, and competitive advantage of the technology before commercialization, this year the division embarks on developing a technology assessment protocol in order to facilitate identification of mature f PhilRice technologies while ensuring the acceptability of target users on the social, technical, economic, environmental and political aspects of the identified technology.

Similarly, the division recognizes the importance of partnerships in achieving meaningful development change. Forging partnerships with various institutions in the country in order to bring improved rice production technologies and maximize livelihood benefits for farming households is currently one of the significant accomplishments of the division. Farmer- associations are being organized and empowered through capacity building and promotion of high yielding rice production technologies. Hence, the division was able to establish/forge 36 partnerships with DA-RFOs, LGUs, farmer coopera-

tives and associations, government and non-government organizations, and other private sectors.

To further strengthen the division in carrying out its core functions in relation to the Institute's goals, some of the innovations it has started this year includes the following: 1) drafting of new training and extension modalities relevant to the changing needs of rice industry stakeholders; and 2) creation of a training and information management system to facilitate storage, retrieval, and management of its training programs.

I. Capacitating Rice Stakeholders to Help Address Rice Insecurity (TMS-002)

AV Antonio

The Philippine Rice Research Institute (PhilRice), a government corporate entity under the Department of Agriculture (DA) has been implementing national rice research and development programs for more than three decades to have a rice secure Philippines. Research divisions of PhilRice continuously develop high-yielding, resilient to climate change technologies to help increase the income of farmers. The technologies and information coupled with strategic components are tested and promoted by the Development group such as the Technology Management and Services Division (TMSD). To support the above initiatives, special studies such as Packaging and Re-packaging Customized Training Courses, Mass-based Technology Promotion, Courseware and Module Development, Enhancing Farmers' Resiliency to Climate Change, and Evaluation of Major Training courses were designed to capacitate rice stakeholders thereby helping address rice insufficiency and insecurity

Packaging of Specialized Training Courses for Commercialization (TMS 002-001)

RA Pineda and AV Antonio

Training and education is a very important strategy in technology promotion. In this regard, PhilRice is customizing training courses to fit the needs of its clients such as farmer-leaders, agricultural extension workers, and professionals. The customized training courses are expected to enhance the knowledge and skills of rice stakeholders.

Activities:

- Conduct of three training courses for 75 potential farmer-leaders with 20% gain in knowledge and VS training evaluation.
- Conduct of three training courses for 75 Agricultural Extension Workers (AEWs) and other professionals with 20% gain in knowledge and VS training evaluation.

Results:

- Four specialized training courses for AEWs of Nueva Ecija, Romblo, Occidental Mindoro, and Nueva Vizcaya were successfully conducted.
- Three specialized training courses for potential farmer-leaders and one training course on Farm Machinery Operation and Safety cum PalayCheck System for Young Farmers were successfully conducted.
- 126 AEWs and 132 farmers were trained on rice and rice-based technologies.
- 65.5% gained-in-knowledge was obtained for AEW and 30.2% for farmers.
- "Very Good" rating was obtained on all training courses conducted.

Figure 1. Conduct of specialized training courses in: (a) Nueva Ecija; (b) Nueva Vizcaya; (c) Romblon; and (d) Quezon.

Enhancing Technology Awareness and Learning through Mass-based Technology Promotion (TMS 002-002)
CG Abadilla

Mass-based technology promotion strategies are proven effective in disseminating technologies to farmers and other end-users. These include- Farmers' Field Day and Forum, Science & Technology (S&T) Update, and Technical Briefing. The activities are done in collaboration with the Local Government Units (LGUs) who help in the mobilization and participation of farmers and other partners.

The S&T Update for Legislators isa half-day briefing on the latest rice and rice-based production technologies developed by PhilRice. This is to encourage legislators to propose policy changes that can help improve implementation of development projects inthe locality. On the other hand, the S&T update for Agricultural Extension Workers (AEWs) is expected to enhance their capability on rice production and other social technologies while the Farmer's Field Day and Forum is expected to further help in promoting rice production technologies to farmers.

Activities:

- Conduct of nine batches of technical briefings for 150 potential farmer-leaders, legislators, extension workers and other professionals.
- Conduct of two institutional field days, one for wet and the other for dry season with about 3,000 participants per Field Day.

Results:

- Conducted nineteen (19) batches of S&T Updates for farmers and AEWs in Nueva Ecija and Aurora with a total of 1,763 and 201, respectively. As shown in Table 1.
- Successfully conducted two institute field days for dry season 2016 with a total attendance of 2,913 and for wet season with 3,084 total participants.

Table 1. Mass-based Science and Technology Updates conducted for CY 2016.

Municipality	Date	Farmers	AEWs/MAOs
Maria Aurora	February 1	30	2
Muñoz	May 21	40	4
San Jose	May 21	100	9
Llanera	May 22	102	4
Rizal	May 22	100	7
Licab	May 24	54	6
Quezon	May 24	81	7
Talavera	May 27	104	8
San Leonardo	May 28	100	5
Sta. Rosa	May 28	102	6
Guimba	May 29	100	6
Talugtug	May 29	100	5
Cabanatuan	May 30	103	7
Bataan	August 5	105	40
Palayan City	August 25		40
Bulacan	August 26		45
Mindoro	September 29	117	
Romblon	October 12	70	
Cabanatuan	November 9	300	
Mabini, Pangasinan	November 14	55	
TOTAL		**1763**	**201**

Note: Increased in accomplishment was due to active participation of Bataan & Bulacan conducting technical briefings during MAO'S meeting.

Module and Courseware Development and Utilization (TMS 002-003)
LdR Abaoag

Modules constitute a training course. It is a self-help guide for a facilitator and or resource person on how a specific topic can best be delivered. It contains the detailed information on the topic, learning objectives, and activities that will complement the learning process. A courseware, on the other hand, is an important tool in information dissemination and in facilitating learning among the trainees. These materials can facilitate easier understanding of concepts and help in remembering information better thus, contributing to the effectiveness of the training.

The training curriculum, modules and courseware need continuous updating and development to include the latest information and technology. It should also be adjusted based on the feedback from the trainer and

the learner. Based on evaluation, the curriculum can be revised and other courseware maybe developed.

Activities:

- Three new course designs on Nutrient Management, Organic Fertilizer Management, and Insect Pest Identification and Management developed.
- Three modules repackaged.

Results:

- Drafted a 3-day training course on Insect Pest Identification & Management with new courseware for review of technical experts.
- Re-packaged module on PalaYcheck and PalaYamanan.

Enhancing Farmers' Resiliency to Climate Change through Game-based Approach (TMS 002-004)
RD Romanillos

To widen the perspective of rice farmers, AEWs and other stakeholders on climate change, TMSD has started developing a Climate-Change SMART Game or CC-SMART Game. The tool is currently being tested in a rice farming community in Nueva Ecija to determine its acceptability and technical viability thereby enhancing their capacity to adapt to climate change effectively.

Activities:

- One training course on Climate change Field School to be implemented in wet season of 2016 with 20 to 30 participants in Cabanatuan City, Nueva Ecija, 20% gain-in-knowledge and VS Training evaluation.
- One new module on climate change drafted based on the conduct of farmers' field school on climate change.
- One techno-demo highlighting the trials on different rainfed rice varieties established and demonstrated One Farmers' field day and forum is conducted with a target of 100 farmers and AEWs.

Results:

- Conducted baseline survey among 36 potential farmer-leaders. Results showed that the average age of farmer-participants is 58 years old, with average landholding of 1.9 ha, rainfed, and average rice yield of 3.3 t/ha. Their perceptions on climate change is limited and only 30% knew about it but 60% of them are very positive that there are ways that they can cope with climate change especially in rice production.
- One training course on climate change FFS implemented from May to October 2016. This was attended by 31 farmer-participants in Kalikid Norte, Cabantuan City, with 52% GIK and VS training evaluation.
- One new FFS module on climate change drafted.
- Established a 0.5 ha techno demo farm highlighting the trials on different rice varieties (NSIC Rc27, Rc23, Rc298, Rc360, and PSB Rc68), nutrient management, and pest management in Kalikid Norte, Cabanatuan City. The yield for the rice varieties in the techno-demo were as follows: NSIC Rc27 – 3.7 t/ha, Rc23 – 3.5 t/ha, Rc298 – 3.2 t/ha, Rc360 - 5.0 t/ha, and PSB Rc68 – 4.8 t/ha. Highest yield was obtained using NSIC Rc360 with 5.0 t/ha followed by PSB Rc68 with 4.8t/ha. Lowest yield was obtained in using NSIC Rc298 with 3.2 t/ha due to rice blast at panicle initiation.
- One farmers' field day and forum conducted in Kalikid Norte, Cabanatuan City, Nueva Ecija on October 4, 2016 which was attended by 127 farmer and AEWs.
- One location-specific technology/production guide on climate change was drafted and presented to farmers and AEWs for finalization.

Figure 2. (a) Climate Change Game-based FFS farmer-participants in Kalikid Norte, Cabanatuan City; (b) Participatory Techno-demo of different rice varieties for Climate Change; and (c) Farmer's Field Day attended by 127 farmers and AEWs held on October 4, 2016.

Tracer Study: Evaluation of Major Training Courses (TMS 002-005)
HB Manalo and RA Pineda

Training has always been the division's major activity. There has been a steady growth in the number of participants in the training program of the division. Studies on training have proven the importance of this intervention in increasing the knowledge of different stakeholders. However, there is also a need to answer the question: what happened to the trainees years after training? Training as an intervention should also include the documentation of changes in former trainees' lives and the community-level knowledge sharing process to ensure curriculum relevance. Hence, the Tracer Study.

Tracing refers to physically locating the research participants, specifically, the former trainees. Purposive sampling was used. Informal in-depth interviews were conducted. Qualitative analysis would be used.

Activities:

- One major training course for farmers evaluated and improved and one community-level knowledge sharing approach identified.

Results:

- Forty-five former trainees of the Training Course on Farm Machinery and Safety for Young Farmers were interviewed. The young farmers were scattered all over the country.
- After coming back from Japan, most of the young farmers were into agriculture-related jobs. Most of them worked in their own farms and with agriculture-related institutions or associations. The said findings were also observed in 2016.
- In Japan, most of the farmers had the opportunity to operate farm machineries such as 4-wheel tractors and mechanical transplanters.
- Direct and indirect contributions of the training were the knowledge that the farmers shared and their employment.
- There was a positive assessment on the conduct of the training however, the short duration of the training needed improvement.
- Additional topics for the training such as latest rice production machineries, longer duration of the training (more than a week), and training farm to allow the use of other machinery such as the combine harvester were recommended.
- Issues on the lack of government support upon their arrival from Japan and training-job mismatch were raised.
- A farmer-to-farmer approach was observed from the sharing behavior of the former trainees.
- Most of the farmers shared their knowledge to non-kin and kin farmers in their community.
- Most of them shared their knowledge on rice production-related technologies such as pest and nutrient management owing to lack of machines in their areas.
- Formal (training) and informal (conversation in the farms) sharing existed in the farmers' community.

Figure 3. On-site interviews in La Union and Aurora.

II. Technology Assessment and Mature Technology Identification (TMS 007)

LdR Abaoag, JV Pascual, and AM Jose

Technology assessment aims to institutionalize a systematic identification and evaluation of PhilRice developed technologies before commercialization. Most of the technologies were not commercialized and used by intended users despite efforts in promotion. Among the major reasons is that the constraints and issues were not anticipated or considered before mass promotion. Thus, gaps and faults of the technologies are not resolved. The process of assessment gathers the feedbacks of clients/users, which serves as basis for refinement before technology commercialization takes place. Moreover, the mature technology identification intends to develop and implement a technology assessment protocol or an operations manual for evaluating maturity of PhilRice technologies while ensuring the acceptability of target users on the social, technical, economic, environmental and political aspects and further refinement of technology. This will bring appropriate and reliable technologies to the target users such as farmers and other rice stakeholders.

Activities:

- Classification of PhilRice developed technologies and completion of the list of technologies that are possible for assessment and commercialization.
- Coordination with technology generators in finalizing field validation and assessment procedures of PhilRice developed technologies. Close coordination or consultation with technology generators/research divisions obtained different ideas for the improvement of assessment procedures and the technology assessment protocol/operations manual.
- Development of methods and procedures in assessing the five classifications of identified PhilRice technologies. This will be included on the institutionalized operations manual.
- Implementation of technology validation (field and table validation). The purpose of conducting technology validation is to gather feedbacks from users/clienteles through actual demonstrations, interviews and review of publications and pertinent documents related to the technology.
- Implementation of analysis and evaluation of PhilRice developed technologies while refining the procedures and the operations manual. Feedbacks from the analysis and evaluation of technology assessment will help the technology generators in refining their technologies.
- Consultation with R&D senior researchers through workshop concerning the finalization of operations manual particularly on the methods/processes to be apply on assessing the (5) different classification of PhilRice developed technologies.

Results:

- PhilRice developed technologies can be divided into five (5) classifications. These are Products, Diagnostic Tools, Information, Services and Process. These classifications determine the nature of activities, strategies and procedures to be applied on the technology assessment and for eventual technology packaging, promotion and transfer.
- Conducted technology assessment briefing and consultation with six research divisions for the continuous development and finalization of procedures of the PhilRice's technology assessment operations manual (RCFSD, CPD, ASPPD, GRD, PBBD, REMD).
- Formulated a checklist/guideline for research divisions to identify the readiness of their technologies and products before subjecting it to assessment process.
- Developed assessment procedures for five classifications of PhilRice technologies from the consultation and discussion conducted with technology generators.
- Conducted field monitoring and technology field validation (on-site and on-field) of MOET App Fertilizer Recommendation Calculator for three cropping seasons (DS 2014, WS 2015 and DS 2015) (Figure 4b).

- Consolidated and analyzed the results of interviews and survey for the analysis and evaluation of MOET App from the technology briefings with AEWs in LGU-Magalang, Pampangaand CALMO, Cabanatuan City.

- Conducted technology field validation, monitoring and evaluation of the Rice Hull Gasifier Stove (RHGS) with (11) household users in Nueva Ecija. (Figure 4a).

- Completed assessment of (2) PhilRice technologies and provided recommendations to the technology generators for additional technology improvement.

- Drafted (1) operations manual on conducting technology assessment.

- Conducted brainstorming/workshop with PhilRice R&D heads and senior researchers to finalize the operations manual on technology assessment and mature technology identification (Figure 4c).

Figure 4. (a) Multi-location field validation of MOET App; (b) Field validation of RHGS in Nueva Ecija; and (c) Brainstorming/workshop for manual completion.

III. Clean, Green, Practical, and Smart On-Farm Learning Center (TMS-008)

FD Garcia and VC Garcia

Demonstration of innovative practices on actual farms has long been a key hallmark of program delivery and teaching in extension work. These on-farm demonstrations gained the confidence of farmers who toured the farms, and has led to successful growth and development of extension systems. Such farm-based demonstrations are being used extensively in extension work as a means of showing and telling farmers exactly what a new or innovative practice is and showing how it will fit under local condition.

The Clean GPS on-farm learning center was established to showcase the rice plant's growth stages at any given time. It is primarily intended for trainees' observation and familiarization of the growth stages of the rice plant. It is a show window for different matured technologies as well as field validation of new innovations to improve rice yields. The center also hosts capacity enhancement activities such as appreciation course on rice science and technology and Rice boot Camp for new agriculture and related sciences graduates. It is also an avenue for hands-on activities on different management practices on growing rice.

The On-farm Learning Center aims to provide experiential learning opportunities for trainees by showcasing new technologies, integrated and diversified rice-based production systems, capacity enhancement and inclusion of other available technology components for increased productivity and profitability. It has developed awareness of PhilRice visitors on the technologies promoted by the institution.

Activities:

- Relay planting to showcase growth stages of the rice plant.

- Showcasing and fine-tuning of the technology of highest yielder in the Palayabangan 10-5 challenge.

- Demonstration of newly released irrigated and rainfed rice varieties.

- Field validation/demonstration of MOET application tool-fertilizer recommendation calculator, and rice crop manager.

- Showcase the different crop establishment techniques for rice.

- Maintenance of practicum area for trainees' hands-on training.

Results:

2016 Dry Season

- During the dry season, a total of seven plantings were done and maintained in the relay rice planting that showcased the growth stages of the rice plant using NSIC Rc222. Sowing and transplanting were done every 21 days so that there will be paddies representing the different growth stages of rice throughout the year. The set-up became the learning field of 20 AEWs who participated in the training on Capacity enhancement for Climate Change Resilent ARC conducted on February 15 to 19, 2016 and Training on PalayCheck System and Farm Machinery Operation and Safety for Young Farmers on March 7 to 11, 2016. Over 2000 Lakbay-Palay attendees also got the chance to observe the stand of the crops in the set-up.

- Showcased and fine-tuned outstanding yielders' technology for wet and dry season. Established the package of technology (POT) of Pioneer Hi-bred Systems using PHB73 in a 0.2ha area.

- Demonstration plot showcasing six newly released irrigated rice varieties was established and maintained. Twenty one (21) day-old were planted in a 0.25ha with 20x20cm plant spacing. The variety planted are NSIC Rc300, Rc302, Rc308, Rc354, 358, and, Rc360. Highest yield was obtained in NSIC Rc360 with 9.0 t/ha followed by NSIC Rc300 and Rc308 with 8.0t/ha. Lowest yield was obtained in NSIC Rc358 with 5.6t/ha.

- MOET Apps fertilizer recommendation was field validated compared with that of the RCM fertilizer recommendation. An area of 1600 was divided into two to accommodate the two fertilizer recommendations. MOET Apps fertilizer recommendation was 4 bags 14-14-14 and 3 bags 46-0-0, while RCM recommendations was 4 bags 14-14-14, 1 bag 16-20-0 and 2 bags 16-20-0 per ha. Grain yield obtained was 6.32t/ha for MOET Apps while 6.52t/ha was realized in RCM.

- An area of 930 m^2 was maintained for hands-on activities of trainees on soil sampling for MOET set-up, seedbed preparation and seed sowing, mechanical and manual transplanting, installation of observation well, and, operation of farm machineries such as hand tractor and 4-wheel tractor. A total of 69 trainees did their hands-on exercises in the area which include 20 young farmers attending the Training on Farm Machinery Operation and Safety cum PalayCheck System on March 7 to 11, 2016 and 49 teachers who attended the Climate Smart Agriculture and Rice Production Training on April 25 to 29, 2016.

2016 Wet Season

- During the wet season, the technology package for rice production of ORB MPC was showcased during the wet season, being the highest yielder in 2015WS in the Palayabangan 10-5 Challenge. A 0.25 ha area was direct-seeded with NSIC Rc222 at the rate of 80kg/ha. Salient feature of the technology is the use of organic-based foliar fertilizers such as Zinc, Calcium, Phosphorus, and Boron. In addition, the use of organic fertilizers in the form of compost and effective microorganism were applied to the crop. Minimal use of inorganic N fertilizer was noted. The crop was harvested on October 24 after the occurrence of two typhoons (Karen and Lawin) that caused the crop to lodge heavily. A grain yield of 6.4t/ha was obtained based from three crop cut samples of 5m2 area gathered before the occurrence of typhoon Lawin on October 20. Over 1000 Lakbay Palay attendees visited the set-up on September 15 to 16, 2016.

- Demonstration plot showcasing six newly released irrigated rice varieties was established and maintained. Twenty one day-old seedlings were planted in a 0.20ha with 20x20cm plant spacing. Other cultural management practices were done following the PalayCheck System for Irrigated Lowland Rice. The variety planted are NSIC Rc394, Rc396, Rc398, Rc400, Rc402, and, Rc222. Highest yield was obtained in NSIC Rc402 with 8.54t/ha followed by NSIC Rc222 with 6.93t/ha. Lowest yield was obtained in NSIC Rc400 with 5.48t/ha. The high yield in Rc402 may be attributed to high number of panicles per unit area and heavier weight of grains.

- Demonstration plot showcasing nine newly released rainfed rice varieties was established and maintained. Twenty one day-old seedlings were planted in a 0.20ha with 20x20cm plant spacing. Other cultural management practices were done following the PalayCheck System. The varieties planted are NSIC Rc348, Rc416, Rc418, Rc420, Rc422, Rc424, Rc426, Rc428 and Rc430. Highyest yield was obtained in NSIC Rc420 with 6.13t/ha and the lowest was NSIC Rc348 with 3.58t/ha. High yields in RC420 was observed due to high percentage filled spikelets and number of panicle per unit area. The low yields in Rc348 is due to low pecent filled spikelets and number of

panicles per unit area (Table 2).

- Three crop establishment methods were showcased: broadcast direct seeding, drum seeding, and mechanical transplanting. Pre-germinated seeds of NSIC Rc422 was direct-seeded with a seeding rate of 40 kg/ha. For the mechanical transplanting, seeds were sown in seedling trays and transplanted at 17 days after sowing. Fertilizer management was based on the recommendation of MOET. Yields obtained are 5.32t/ha for broadcast-seeding, 4.7t/ha in Drum-seeding, and 5.12t/ha in mechanical transplanting.

- An area of 1000m2 was maintained during the season and served as demonstration area for field machines such as the mechanical transplanter during the Lakbay-Palay 2016 conducted on September 15 to 16, 2016.

Table 2. Grain yield and agronomic characteristics of rainfed and irrigated lowland rice varieties during the 2016WS.

Test Entries	Grain Yield, t/ha	Date harvested	Maturity Days		% Filled spikelets	1000-grain wt	No, of panicles/ m2
			CES Condition	National Average			
Rainfed Lowland Varieties							
NSIC Rc 348	3.58	19-Sep	109	103	47.1	34.8	294
NSIC Rc 416	4.89	21-Sep	112	116	61.1	24.8	338
NSIC Rc 418	5.30	23-Sep	113	113	75.3	25.2	300
NSIC Rc420	6.13	7-Oct	125	108	94.2	23.9	494
NSIC Rc422	5.59	22-Sep	112	112	81.3	23.2	456
NSIC Rc424	5.97	22-Sep	112	110	86.7	27.4	313
NSIC Rc426	5.30	19-Sep	110	110	62.0	25.1	325
NSIC Rc428	4.59	20-Sep	110	107	51.1	29.7	325
NSIC Rc430	4.70	23-Sep	113	111	70.6	23.7	306
Irrigated Lowland Varieties							
NSIC Rc222	6.93	3-Oct	121	114	57.2	24.76	381
NSIC Rc394	6.11	25-Sep	115	112	94.3	23.47	206
NSIC Rc396	5.91	6-Oct	124	114	91.8	23.35	244
NSIC Rc398	5.99	3-Oct	123	113	79.6	28.42	275
NSIC Rc400	5.48	6-Oct	126	120	81.3	25.30	256
NSIC Rc402	8.55	3-Oct	123	107	84.9	27.19	381

IV. Experts Dispatch (TMS-009)

OC Malonzo

PhilRice was created and mandated to help develop high yielding, cost-reducing, and environment-friendly technologies so farmers can produce enough rice for all Filipinos. It is powered by a multi-disciplinary pool of Research and Development experts who possess high level of commitment to serve the rice farmers and its partners. This project aims to provide quick response to various rice-based problems and needs of clients by a pool or research and development experts and forge partnerships with clients and stakeholders on rice and rice-based farming ventures. During the years, the most requested assistance and services from PhilRice experts include requests for resource persons, facilitators, and discussants in various rice and related trainings, seminars, conferences, and symposia while other partners request assistance in the crafting of agricultural development initiatives.

Activities:

- Experts dispatch.

- Collaboration and partnership building.

Results:

- Responded to 16 requests for various assistance and services requested from farmer-cooperatives and 8 partner-agencies under the Department of Agriculture. These were the Agricultural Training Institute in Regions 1 and 3; the National Irrigation Administration; the Department of Agriculture central office; Bureau of Plant Industry; Department of Social Welfare and Development in Region 1; the Local Government Units of Palayan City and San Jose del Monte Bulacan; and the Bagong Pag-asa ng Magsasaka, a farmers cooperative in San Fernando Norte, Cabiao, Nueva Ecija. All requests were addressed, which correspondingly benefitted 269 Agricultural Extension Workers and 1,258 farmers. The nature of interventions include provision of expertise as Resource Person and Discussant on PhilRice programs and thrusts, rice science and technology, and Good Agricultural Practices during trainings, seminars, workshops, and farmers' congress.

- One collaborative project, titled "Pagsasanay sa Produksiyon ng Palay at iba pang Pangkabuhayan" was developed and implemented with the Department of Social Welfare and Development in Region 1. The intervention benefitted 88 rainfed rice farmers and Pantawid program beneficiaries from the different barangays in Mabini, Pangasinan.

- Maintained collaborations with the Agricultural Fisheries and Extension Network (AFEN), Central Luzon Agriculture and Fisheries Extension Network (CLAFEN), and the Regional Agriculture and Fishery Council (RAFC).

Figure 5. Beneficiaries (left) and Project Implementers (right) of the newly-developed DSWD-PhilRice-LGU Mabini Collaborative Project on "Pagsasanay sa Produksiyon ng Palay at iba pang Pangkabuhayan" or 4Ps training.

V. Collaborative Partnership as a Strategy for Enhancing Community Livelihoods (TMS-010)

AM Corales

Several literatures indicate that the pursuit of partnerships is presently one of the most significant trends in community organizing and development. This could be due to the fact that there is now a growing realization that resources are becoming limited and so there is a need to cooperate in order to tackle the many challenges facing the community.

Similarly, PhilRice recognizes the importance of partnerships in achieving meaningful development change. Over the years, it has forged partnerships with various institutions in the country in order to bring improved rice production and postproduction technologies and maximize livelihood benefits for farming households. The organizations and agencies in which PhilRice has forged partnership with believe that through collaborative partnerships the livelihood of rural communities can be enhanced hence this project.

The primary objective of the project is to enhance the livelihood of farming households by accelerating the promotion of improved rice and rice-based technologies with the help of private and public partners. It is composed of two major studies, namely: Empowering Farmers' Cooperatives through Sustainable Promotion of High Yielding Rice Production Technologies for Progressive Rural Economy; and 2) Mobilizing the Rice Value Chain Enablers in Sta. Barbara, Pangasinan.

Empowering Farmers' Cooperatives through Sustainable Promotion of High Yielding Rice Production Technologies for Progressive Rural Economy (TMS 010-001)

JV Pascual, AM Corales, and CC Guittap

One approach to gain economy of scale is through farmer-cooperatives. As members unite to solve common problems, the pooling of resources makes investment in farm machineries and physical infrastructure possible thereby resulting to improved production, price management and dispersion of business risks. Cooperatives also offer the opportunity for vertical integration of farm operations and enhanced market competition.

Given the potentials of cooperatives in promoting efficiency in production, marketing, and risk management, it has often been used as a policy instrument by the government in implementing various agricultural interventions. Under the Food Staple Sufficiency Program of the Philippine Government, in particular, preference is given to qualified Irrigators' Associations (IAs) and farmers' cooperatives in the provision of machinery and postharvest facilities. Similarly, enhanced extension services which aim to accelerate the adoption of new and improved high yielding production technologies give priority to IAs and farmers' cooperatives.

In general, this study aimed to help enhance the capacity of agricultural cooperatives in their pursuit of achieving community development and competitiveness by improving productivity through modernized agriculture.

Activities:

- Starting 2016, the study expanded in Pangasinan covering two (2) farmer-cooperatives, namely: Pangoloan Farmpreneur MPC in San Carlos City and Calapugan Agrarian Reform Cooperative in Natividad. The major activities conducted were the following: a) promotion of high yielding technologies through modified Farmers' Field School; b) technology demonstration; c) formation of farm guidance team; d) training on farm mechanization and custom service provision; e) establishment of technology center; and f) promotion of crop diversification and agri-preneurship.

Results:

- For DS 2016 cropping, (12) topics were provided to the participating farmers as part of the training course for coop-members on rice technologies and some agriculture-related activities. After the two season-long training courses, fifty-eight (58) coop-members graduated from the training course with an average of 48.50% gain in knowledge (GIK).

- In DS 2015-2016, demonstration fields for the promotion of newly released inbred rice varieties were established. Results showed that NSIC Rc222 achieved the highest yield of 6.85 t/ha, followed by NSIC Rc308 at 5.82t/ha, and NSIC Rc360 at 5.25t/ha). NSIC Rc352 got the lowest yield of (4.22t/ha).

- Results of DS 2016 cropping shows that Parista BDS-MPCI participating farmers achieved a yield ranging from 3.5 to 7.8t/ha with an average yield of 4.48t/ha. This is higher compared to DS 2015 average yield of 3.74 t/ha. Forty-three (43) out of (59) farmers had a yield increment ranging from 0.05 to 3.60 t/ha; (16) of them had more than 1 t/ha increase in yield ranging from 1.23 to 3.6t/ha. After 2 cropping seasons, the participating farmers' level of technology adoption is at 78% equivalent to high level of adoption.

- Through partnership with the Provincial Agriculture Office of Pangasinan, the Pangoloan Farmpreneur Multi-Purpose Cooperative in San Carlos City and Calapugan Agrarian Reform Cooperative in Natividad, Pangasinan were selected as new partners for the sustainable promotion of high-yielding rice and rice-based technologies. A season-long training course on rice S&T was started in each partner-coop for WS 2016 cropping, with the established demonstration fields promoting PalayCheck System and newly released irrigated and rainfed rice varieties for seed multiplication.

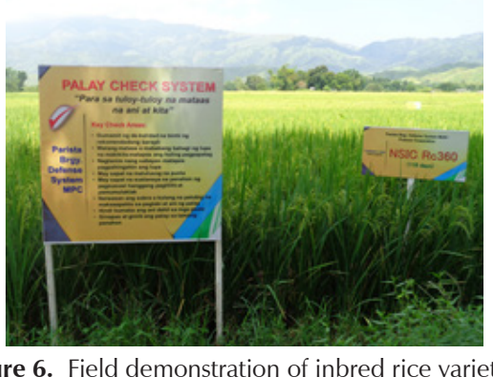

Figure 6. Field demonstration of inbred rice varieties.

Mobilizing the Rice Value Chain Enablers in Sta. Barbara, Pangasinan (TMS 010-002).
AM Corales, and GD Martin

Taking a value chain approach to rural development addresses the major constraints and opportunities faced by farmers and producers, processors, traders and other businesses at multiple levels along a given value chain. Employing a value chain approach, however, needs a connected string of groups or stakeholders and other players working altogether to satisfy market demands for a particular product or group of products. Through the value chain approach, it is expected that farmers' organizations will be empowered in achieving competitiveness.

The study aims to develop a business model in rice-based farming by mobilizing the value chain enablers in the locality. The enablers are expected to provide various kind of support for the farmer organization in order to include them in the value-addition processes of rice production, processing, and marketing.

Activities:

- Distributed seeds preferred by farmers with high market acceptability.

- Tapped various actors in the rice-based value chain for support especially market linkage.

- Conducted Rice S&T updates during the 3 critical growth phases of the rice plant.

Results:

- For 2016 dry season, a total of 60 bags of certified seeds (NSIC Rc216 and 160) covering about 48 ha were distributed to 43 members of the BANERLE Agrarian Reform Community in Sta. Barbara, Pangasinan.

- The partner-agencies tapped to collaborate in project implementation were the following: Office of the Provincial Agriculturist (OPAg), Department of Agriculture-Regional Field Office 1 (DA-RFO1), Pangasinan Rice Processing Complex (PRPC), and Local Government Unit (LGU) Sta. Barbara.

- Have established linkage with the Pangasinan Rice Processing Complex (PRPC) to have an alternative market with good product efficiency.

- A Farmers' Field Day and Forum was conducted on February

26, 2016 in Barangay Erfe, Sta. Barbara, Pangasinan. This was attended by 100 participants.

- An average yield of 4.07t/ha was achieved which is 0.15t/ha lower from the baseline yield of 4.22t/ha. The main reason for the decrease in yield was due to the incidence of rice blast and lack of water in the site.

- Twenty-nine percent (29%) of the participating farmers' produce in BANERLE ARC was sold to PRPC.

Figure 7. Activities conducted: (a) Distribution of certified seeds to farmer-cooperators and (b) Field monitoring and evaluation.

VI. Externally Funded Projects

Agricultural Support Component of the National Irrigation Sector Rehabilitation and Improvement Project
LdR Abaoag, AM Corales, VB Isidro, and Rice Technicians

The Philippine government and Japan International Cooperation Agency (JICA) implemented the National Irrigation Sector Rehabilitation and Improvement Project in 2013. The project aims to contribute to the national rice self-sufficiency program of the government by strengthening the irrigation sector in the country. Forty five (45) Irrigators' Associations (IAs) in 11 national irrigation systems (NIS) were selected as project beneficiaries.

PhilRice leads one of its soft components, the Agricultural Support (AgriSupport), which focuses on the capacity enhancement of the farmer-beneficiaries. It specifically includes 1) establishment of participatory demonstration farm (PDF) cum seed production area with corresponding capacity enhancement of the IA members, NIS personnel and the Local Government Unit-Agricultural Technologists (LGU-AT); and 2) provision of agricultural machinery.

While the project is in its 3rd year of implementation, most of the activities were already accomplished. Total procurement and delivery of farm machinery are expected to be completed until the first quarter of 2017.

Activities:

- Conducted FFS for dry season (DS) 2016 in SDC, TNB and BAMMK IAs in Muleta; and Podimid IA in Lambayong.

- Established three PDFs in Podimid IA.

- Procured more than half of total number of farm machinery requested, where 77% of these have already been delivered to the IAs.

- Conducted Mid-year Review and Planning Workshop.

- Conducted Mass Graduation in Simulao and Muleta NIS.

Results:

A. Successfully conducted FFS for dry season (DS) 2016 in SDC, TNB and BAMMK IAs in Muleta; and Podimid IA in Lambayong.

- Participants of the training ranges from 12-15 (TNB), 29-35 (BAMMK), 15-20 (SDC), and 20-45 (Podimid).

- Seven (7) Farmer-Trainers (FTs) in Muleta and two (2) in Podimid served as facilitators during the conduct of the season-

long FFS.

- Majority of the participants did not plant for DS 2016 as they were informed of the water cut-off to give way to the canal rehabilitation. Some farmers still took the risk and planted rice. Rehabilitation however, did not materialize.

- The yield of the farmers who planted rice decreased mainly due to the inadequate supply of water. Infestation of pests such as rice black bug (RBB) and stem borer also contributed to the yield decrease.

- From the farmers' estimated average yield of 4.5 and 6.0t/ha during WS 2015 in Muleta sites and in Podimid, the yield decreased to only 2.5 and 2.0t/ha in DS 2016 respectively.

- Farmers used water pump to augment water supply but still was inadequate especially during the dry season.

- In Lambayong, Sultan Kudarat, it was observed that there are more RBB and stemborer during dry season than in the wet season. These pests however, are best treated using Metarhizium anisopliae, a fungus that grows naturally and causes disease in pest insects by acting as a parasitoid, hence reducing their damage to rice plant. However, fungus dies without enough water, thus the use of Metarhizium was not effective in the case of Podimid where there is insufficient water supply.

- As for the project monitoring, the RiceTechs still meet with the IA members at least once a month for consultations and providing technical guidance on field problems. They also provide technical updating to continuously improve the farmers' practices.

B. Established 3 PDFs in Podimid IA, Lambayong for DS 2016
   - Just like the yield of participating farmers, yield of PDFs in Podimid IA decreased due to insufficient water supply. From the average baseline yield (DS 2015) of 4.17 t/ha, the yield decreased to only 3.07 t/ha for DS 2016.

C. Procured 51% of total number of farm machinery requested
   - As of November 2016, 185 units of agricultural machinery have already been procured. This represents 51% of the total number of machineries requested. Most of these agricultural machinery are in the category of small value procurement and 77% of which were already delivered to IAs. The remaining machineries are being scheduled for delivery.

Figure 8. Delivery of farm machinery to IA beneficiaries.

D. Mid-year Review and Planning Workshop was conducted in PhilRice- Central Experiment Station on 7-8 June 2016
   - Collaborators from Project Management Office (PMO) and JICA-Consultants participated in the said activity. Rice Technicians presented the overall project accomplishments which include number of PDF established, FFS conducted, as well as number of machineries procured and delivered. Most importantly, yield and production costs of participating farmers were among the data gathered and consolidated to further assess the effect of the project in its farmer beneficiaries.

   - Issues on the implementation of the project were also discussed and clarified specially on the terms of payment for the agricultural machinery. Overall, the event was successfully conducted.

E. Mass Graduation in Simulao and Muleta
   - More than 150 farmers graduated the four (4) season-long FFS in Simulao (Agusan) and another 150 farmers from Muleta (Bukidnon) are expected to receive their Certificate of Training on November 24, 2016.

VII. Science and Technology Community-Based Farm (STCBF) on Rice Integrated Crop Management in Increasing Farmer's Productivity and Profitability in Selected Irrigated Provinces in the Philippines.

FD Garcia, KS Ruiz, JC Macadamia, and local teams

The STCBF Project modality scaled and enhanced the previous Science and Technology Based Farm (STBF), which showcased the effectiveness of component-based S&T-interventions, to improve productivity while empowering the members of a certain community. This community-based approach promoted wider adoption of the enhanced Rice Integrated Crop Management (Rice ICM) as a result of integrating four major STBF components on rice such as utilization of quality seeds of recommended varieties, site-specific nutrient management, water and pest management that were proven productive and cost-effective in nature.

The sites were the previous STBF project sites situated in the provinces of Pangasinan, Isabela, Leyte, Negros Oriental, Sultan Kudarat and South Cotabato with potential and capable Lead Farmer Beneficiaries (LFBs) as Magsasakang Siyentista or Farmer Scientists. These identified sites successfully executed the STBF project for 2 years. With regards to the community involvement in the project, the identified production cluster in every participating province will require 30 to 35 hectares adjacent rice areas within the production cluster involving 30 to 35 farmers with committed rice areas ranging from 0.5 to 1.5 ha each beneficiary or the whole farm. They are willing and committed their time and resources to enhance their innate skills in rice farming by participating in the specialized training in the STCBF on Rice ICM. The training capacitated FBs and the organization on quality rice seed production, group marketing, capital build-up and other project interventions. The Magsasakang Siyentista or trained STBF farmer-cooperators with the assistance of LGU Supervising ATs and PhilRice technical staff served as resource persons and facilitators during the training and technology updating. The STCBF modality upscaled the STBF approach in promoting & transferring technology for increased rice yield and income of the organized or clustered rice farmers.

Activities:

- Identified, integrated and packaged high yielding Rice ICM practices in rice production tested from the previous STBF on rice projects.
- Increasing farmer's productivity and income in the project sites.
- Enhanced the capabilities of FBs to produce and use high quality seeds and sustain a viable seed system for the STCBF farmer organization and the farming community.
- Showcased STCBF on Rice ICM to serve as community-based techno demo farms cum seed production areas in 6 production clusters composed of 30-35 ha per cluster.
- Conducted Seasonal Technology Field Days (TFDs) per season showing the agronomic and yield performance of the STCBF on Rice ICM.

Results:

- Drafted the revised Rice ICM S&T package based from the results of technodemos in the six provinces. In addition, 500 pcs of primer on Rice ICM distributed to farmers and other rice stakeholders. Techno guides on rice production and other IEC materials were also distributed.
- Increased farmer's productivity and income in the project sites. Yield increase of FBs in Pangasinan was 0.71 t/ha during the DS and 0.24t/ha during the WS. In Leyte, a yield increase of 0.2 and 0.12t/ha was realized in the WS and DS, respectively. In Negros Oriental, a yield increase of 0.79 and 1.43t/ha was obtained in the WS and DS, respectively. In South Cotabato, a yield increase of 0.66 and 1.44t/ha was obtained by FBs during the WS and DS, respectively. In Sultan Kudarat, a 0.98 and 1.24t/ha yield increase was obtained during the WS and DS respectively. For Lead Farmer Beneficiaries, highest average yield was obtained by Pangasinan (6.84t/ha) for the four season implementation of the project, while the lowest was noted in Leyte with average yield of 3.38t/ha (Table 3).
- Conducted four Farmer-Beneficiary Trainings (FBTs) focused on the use of high quality seeds of recommended varieties or quality seeds utilization, site-specific nutrient management, controlled irrigation and integrated pest management. FBTs conducted in Pangasinan with 45 FBs, Negros Oriental with (42) FBs, South Cotabato with (35) FBs, and Sultan Kudarat with (35) FBs.
- Established STCBF on Rice ICM demonstration sites in Esmeralda, Balungao, Pangasinan with Rodolfo Camba & Renato Nava as LFB who planted NSIC Rc222, 298 308, and 342. In Brgy. Nangka, Bayawan City, Negros Oriental with Vivencio Yurong and Constantino Moleno as LFB planted NSIC Rc216, 238, 298, 300, and 302. In Brgy. EJC Montilla, Tacurong City,

Sultan Kudarat with Diomedes Cambiado and Arnel Ortega as LFB planted NSIC Rc152, 298, and, 302. In Brgy. Lagao, Gen. Santos City, South Cotabato with Elena Vailoces and Novelito Ancheta planted NSIC Rc158, 238, 298, and, 302.

- Conducted six municipal-wide Seasonal Technology Field Days (TFDs) per season showing the agronomic and yield performance of the STCBF on Rice ICM. Technology field days were conducted in Pangasinan, Negros Oriental, South Cotabato, and, Sultan Kudarat on March 4, April 5, February 29, and, Machr 1, 2016, respectively.

Table 3. Grain yield of lead farmer beneficiaries in the project sites. 2014WS-2016DS.

Municipality	2014WS	2015DS	2015WS	2016DS	Average
Balungao, Pangasinan	8.93	4.99	8.51	4.93	6.84
San Mateo, Isabela	7.07	7.37	7.95	0.00	5.60
Jaro, Leyte	2.67	7.79	3.05	0.00	3.38
Bayawan City, Negros Oriental	6.59	7.94	6.05	6.55	6.78
Tacurong City, Sultan Kudarat	5.83	4.47	3.64	3.22	4.29
Gen. Santos City, South Cotabato	5.38	0.00	5.94	5.07	4.10

No set-up in GenSan during the 2015DS and Leyte and Isabela during the 2016DS

VIII. Science and Technology Model Farm on Integrated Rice and Rice-based Package of Technology Project.

RB Miranda, MEM Pagay, JHT Cortez, RB Malasa, WT Gardoce, NS Sagun and technical experts

In 2010 to 2012, PhilRice, PCAARRD and LGUs jointly implemented Science and Technology-based Farm to increase farmer's productivity and income by demonstrating and understanding the S&T-based in rice production. Interventions focused on utilization of quality rice seeds, site-specific nutrient management, water and pest managements. For 2 years, the best R&D results in every component were compared to farmer practices. It was implemented in 31 municipalities including Victoria, Tarlac.

Because of the project, the organization of farmers in Victoria was registered as full-pledge cooperative under the Cooperative Development Authority named "Masalasa STBF Marketing Cooperative".

This year (2016), PCAARRD funded another transformational project STMF on Rice and Rice-based POT in similar municipality. The project showcases the economic advantages of adopting Integrated Rice-based POT into a commercial scale of rice and rice-based products.

Activities:

Activity 1. Achieve 5 to 10% increase in yield during wet season 2016 through the use of best high yielding inbred rice varieties (NSIC Rc352, Rc358, Rc222, Rc218, and Rc160) and pre-identified and tested BMPs on rice.

a. Target 7 tons in rice production for WS 2016 through the use of best high yielding inbred varieties and pre-identified and tested BMPs on rice.

b. Assist and provide technical expertise and farm supervision as identified in the S & T intervention.

c. Supervise the use of LCC and MOET as basis for fertilizer application.

d. Assist and conduct regular field monitoring and project planning.

Activity 2. Further capacitate the trained farmer cooperator and farmer adopters on improved rice and rice-based production package of technology.

a. Coordinate and conduct field tours and seminar series of different package of technologies for rice-based farming and

other possible source of income that is adaptable to LFB and FBs.

b. Assist and supervise the establishment of technology-based farm for hands-on activity of different technologies.

Activity 3. Create and strengthen linkage/partnership with development stakeholders, local and institutional markets of marketable products to be produced.

a. Conduct market scanning of farm produced and coordinate NGOs for possible market linkage.

b. Attend agricultural conferences to tap possible market partners.

Activity 4. Promote a wider adoption of tested/recommended high yielding Rice integrated Crop Management (ICM) practices in rice production through STMF modality.

a. Provide database of existing best management practices (BMP) of LFB and FB.

b. Establishment of 20 ha rice production areas through the adoption of rice ICM and rice-based package of technology.

Activity 5. Attend project renewal and planning seminar for STMF project.

a. Present project accomplishments for Year 1.

b. Present future activities and targets for Year 2.

Results:

- Project activities, strategies, rice-based components, technical and financial soundness of the project were discussed and finalized during the Stakeholders' Meeting at PhilRice CES last March 25, 2016. The discussion was participated by partner-agencies and representatives of collaborating agencies from Masalasa STBF Marketing Cooperative, LGU Victoria, Tarlac, CLSU, CLARRDEC, DA-ATI, and OPAG Tarlac.

- The partnership among implementing parties (PhilRice, Masalasa STBF Marketing Cooperative and LGU Victoria) was formalized last April 8, 2016. The forging of signatures was witness by 101 guests, partners-agencies, and farmer beneficiaries. It was then followed by Project Launching or unveiling of model farm lay-out or map.

- Provided 65 bags registered seeds of farmers' preferred and newly-released varieties, namely: NSIC Rc352, NSIC Rc218, NSIC Rc222, NSIC Rc160, and NSIC Rc358 ; 62 bags UREA (adds-on fertilizer) and nutrient management tools (MOET and LCC) to all beneficiaries. These inputs are intended for 38ha seed production area in the Masalasa , Victoria Tarlac.

- Before seed distribution, the PMT conducted a whole-day Technical Briefing on Rice ICM focused on the four major rice production components, namely: use of quality rice seeds of recommended varieties, site-specific nutrient management, controlled irrigation and integrated pest management. The event was successfully conducted last May 26, 2016 with 60 farmer participants.

- Exposure trips to technology agents and carriers of rice and rice-based sciences in the Science City of Muñoz, Nueva Ecija were conducted. Thirty farmer participants visited projects in PhilRice, Central Luzon State University, Philippine Postharvest and Mechanization, and Bureau of Fisheries and Aquatic Resources.

- The detailed project guidebook was drafted. Technical experts on aquaculture, marketing and business, livestock and socio-economics are currently reviewing the technical and financial soundness of the material. The project leader initially reviewed the guidebook.

- The rice component monitoring form named Tekno Gabay sa Pagpapalayan was pre-tested and subject for final editing and revisions.

- The PMT regularly monitor and supervise the model farm activities. Every Thursday is the scheduled meeting with cooperative Board of Directors (BOD) followed by farm consultations.

Figure 9. STMF project launching and MOA signing-April 08, 2016.

Figure 10. Conduct of training: (a) Training on "Sustainable Vegetable Production and Marketing"; and (b) Rice-Fish Technology and Tilapia Culture.

IX. Enhancing Local Community and Enterprise Building in Farming Communities (Heirloom rice Project)

RB Miranda, LL Mandia, JD Batcagan, NA Sabigan, RSCredo, ED Maraganas, and AB Acierto

The focus of this project is on the heirloom rice varieties and how farmers' self-help groups can be capacitated to build and operate smallholders' enterprises that can help them raise productivity and incomes. Heirloom rices are defined here as rice cultivars that have been passed down for generations through family members, and are normally grown only in small family farms. Heirloom rices are in demand locally and internationally due to their exceptional cooking quality, flavor, aroma, texture, color and nutritional value. These varieties are also resilient, exhibiting high levels of resistance to biotic stresses and tolerance to abiotic stresses.

The project generally aims to enhance productivity and livelihoods and conserve in-situ on-farm farmer-preferred heirloom/traditional, climate-resilient varieties and upland food crops by providing rice genetic resources and management options to smallholder groups and enterprises as models. To enhance local capacity for organizing and developing entrepreneurial skills among farming communities for seeds and crop products development, supervising/LGU-AEWs and SHGs shall be linked to private entrepreneurs, NGOs, and other partner agencies for training and exposure on seed purification, product development and entrepreneurial skills.

Activities:

- Establishment of variety demonstration of 10-20 heirloom varieties for characterization, purification, and, seed production.
- Establishment of demonstration and seed production plots for identified and characterized heirloom varieties.
- Conduct of 14 Farmer Field Schools (FFS) at farmers' level focusing on variety selection, production, storage and maintenance of good quality seeds and other training needs identified.
- Strengthening existing community Self-Help Groups (SHGs) of men and women farmers/indigenous people for better market linkage.

Results:

- Twelve (12) Farmer cooperators identified, PTD trials per site with more or less 1000 m2 area established for demonstrations, seed purification and seed production plots.

- A total of 124 varieties collected in 7 municipalities of CAR, 2 municipalities from North Cotabato, and 1 municipality in SK grown in more or less 1000 sq. m plots used for characterization, purification, and seed production. There were (13) varieties demonstrated, characterized, and purified in Benguet, (16) in Mt. Province (19) in Kalinga, (22) in Ifugao, (38) were from North Cotabato, and (16) from Sultan Kudarat.

- Established a total of (12) demonstration and seed production farms for farmer's preferred varieties having an average yield 2-3 tons per ha (Kalinga-Chong-ak and Ulikan; Ifugao- Minaangan and Tinawon; Mt. Province-Chorchor-os, Ominio and Balatinaw; Benguet; Lasbakan and Balatinaw).

- Twelve (12) training study groups with an average of 25 to 35 participating farmers were organized in 7 municipalities of CAR, 2 municipalities in North Cotabato, and 1 from Sultan Kudarat. Identified and organized 10 training teams for 6 provinces composed of SCU and LGU project partners.

- (13) season-long Farmer Field School (FFS) and other capacity enhancement on crop production and enterprise management conducted in 6 provinces in collaboration with DA-RFOs, SCUs, LGUs, and SHGs/Cooperatives (Figure 15). Achieved an average of 25 to 35 pax per FFS with a total of 459 participants. Developed a Farmer Field School Curriculum Guide used in all project sites in CAR and Region 12.

- Organized/strengthened existing (12) community SHGs of men and women farmers/ indigenous people for better productivity and market linkages. Potential seed producers of premium heirloom rice varieties are being tapped and linked to market chains both local and international. Distribution of farm machinery and equipment such as 14 panicle thresher,12 micro tillers, 9 grain moisture meter, 8 mini threshers,13 weighing scales, 26 knapsack sprayers, 420 super grain bags.

- Hands on activities on Organic Foliar Fertilizer Fermentations (Fermented Fruit & Plant Juice, Oriented Herbal Nutrient, Snail & Fish Amino Acid) and Indigenous Micro Organism were conducted in each site for supplemental source of plant nutrients.

- Conducted testing and evaluation of mechanical interventions such as micro tiller (with floater), panicle thresher, and mini thresher distributed in 11 SHGs in CAR. Results of the evaluation gained high approval of the farmers as it proved to reduce manual labor and time during land preparation.

- Successfully conducted four batches of Farmers' Field Day and Forum in Kalinga (May 31, 2016), Ifugao (June 02, 2016), Mountain Province (June 07, 2016) and Benguet (July 14, 2016) attended and participated by 605 highland farmers, extension workers, project implementers, and other stakeholders (Figure 11).

- On-going development of a PalayCheck System for Highland Organic Rice Production, a location-specific technology, integrating the best farming practices in the area. Documentation of best and new farming practices from seed selection to post-harvest activities was done through farmer interviews (Focus Group Discussion and Participatory Needs and Opportunities Assessment), participatory discussion during FFS, and study results from the established FFS learning field trials and Participatory Heirloom Rice Characterization Plot (PHRCP).

- On-going data gathering and consolidation of the production cost analysis using the Heirloom Rice Production Guide designed for identified farmer cooperators of each site.

- Completion of area measurement using Global Positioning System (GPS) conducted in all project sites in CAR and Region XII.

Figure 11. Heirloom Rice Farmers' Field Day and Forum in: (a) Mountain Province; (b) Ifugao; (c) Kalinga; and (d) Benguet.

X. Field Purification and Seed Production of Selected Traditional Upland Varieties

RB Miranda, LL Mandia, MJ Manalang, MA Abando, JC Macadamia, SP Aqunio, JS Baldoz, MG Montero, AE Comprado, FA Pantin, SA Bouquil, ED Maraganas, and AB Mama

This four-year project with four components was implemented since 2013 in selected areas in the Philippines. The main purpose of this project is to determine the genetic identity, grain quality profile, and nutritional value of selected traditional rice varieties to ensure the consistency of the traditional rice varieties' excellent export quality and enhance their marketability and saleability in a competitive world market. Project Component 4, on the other hand, aims to enhance productivity, profitability, and livelihoods of upland and highland farming communities by purifying and producing quality seeds of premium traditional rice varieties with high domestic and export potential and develop smallholder groups and enterprises as business models.

Activities:

- Identification of top two most varieties in all covered regions with high market potential for local and international market (Table 4).
- Identified, evaluated, and trained potential Upland Seed Producers.
- Identification and selection of production areas.
- Development of farmer-based cooperatives (Figure 12).
- Linkaging of Farmer Organizations to DA-RFOs and market outlets.

Results:

- Identified (131) upland seed producers capable and willing to undergo training on upland rice seed production. At least 200 kg of quality seeds per variety shall be purified, produced and passed in seed certification (Table 10).
- (131) production areas with at least 0.5 ha were identified and validated favourable for commercial production of identified pigmented, white, and aromatic upland rice varieties.
- Identified and validated production areas for the selected upland varieties with potential farmer-based cooperatives/associations for training on rice production. At least two (2) Upland Farmer Organizations (UFOs) per Upland Technologist orga-

nized, capacitated, and supervised for registration to DOLE, CDA, or SEC as accredited farmer-based cooperatives. As of November 2016, (49) UFOs were identified in (10) regions that will be linked to DA-RFOs and potential market outlets.

- Started identifying and masterlisting potential local markets/ traders for premium traditional varieties linking farmer organizations through capacity enhancement and other development assistance.

- On-going distribution of (11) units Mini-thresher, (11) pcs saclob, and (3) pcs weighing scale to identified and selected upland farmer organizations.

- Continuous profiling of UFOs, farmers associations, and cooperatives.

Table 4. Top two most varieties per region with high market potential for local and international market.

Region	Traditional Varieties
Region I	Malapay and Maliket/ Maluit
CAR	Dumalengan and Mimis
Region II	Pinilisa and Balatinaw
Region III	Galo and Binernal White
Region IV-A	Inipot-ibon and Pinalawan
Region IV-B	Milagrosa and Tipak
Region V	Black Rice and Red Blondie
Region VI	Malido Red and Palawan
Region VII	Kanukot and Tumindog
Region VIII	Kalinayan and Baysilanon
Region IX	Ismagol and Kalingkit
Region X	Dinorado and Speaker
Region XI	Remulites and Peria
Region XII	Azucena and Dinorado
ARMM	Kalingkit (Black) and Gabay
Other Verities	Red Rice, Kalibo, Binundok, S, 75 days, Gobyerno, Kanting, Pinili, Duriat, Hinumay, Inabaka, Katibos and Bulaw, Black Rice

Figure 12. Training and organization of upland farmers.

XI. On-farm Evaluation of Korean Varieties

AM Corales and LR Aquino

Over the years, rice productivity has greatly increased in Koreawith the use of iron farming implements and new farming methods and techniques suitable to Korean soil and climate thereby achieving a self-sufficiency ratio of almost 100 percent. Today, South Korea produces an average rice yield of 7.3t/ha from a harvested area of 936,766 hectares (IRRI, 2009). In September 2010, the Korea Project on International Agriculture (KOPIA) was established in the Philippines specifically at PhilRice Central Experiment Station (CES). The following year initial R&D activities started including adaptability testing of varieties and dry seeding, among others. Due to promising results obtained in adaptability tests conducted, on-farm evaluation of Korean varieties was extended in selected sites outside PhilRice CES such as Pangasinan, Nueva Ecija, and Tarlac in order to check their adaptability to Philippine condition.

Activities:

- Gather farmers' best management practices to identify the most effective and efficient way of growing Korean varieties. Conduct Farmers' Field day and Forum to showcase the performance of Korean varieties as a way of promoting it to farmers.

- Conduct bimonthly field monitoring in all project sites. Field visits were done to ensure that all Korean varieties distributed were planted and properly taken care of.

- Identify farmer-growers who were capable of producing good quality seeds.

- Create market linkage with rice traders and millers who are interested in Korean rice.

- Conduct capacity building activities such as Rice S&T updates and specialized training course for future farmer-cooperators.

- Distribute seeds to potential farmer-cooperators.

- Conduct GPS area measurement for the new sites in Tarlac and Nueva Ecija.

Results:

- The highest yield obtained in the project site for 2016 is 7.50t/ha. Last March 9, 2016, a Farmers' Field day was conducted in. Paitan Norte, Cuyapo, Nueva Ecija. Two hundred twenty-nine (229) participants joined the activity. The varieties showcased were Milyang 23, Hanareumbyeo 2 and Hangganchal 2. Sensory evaluation was done in cooperation with the Rice Chemistry and Food Science Division. Milyang 23 got the highest acceptability rating of 100% for cooked rice and 96.7% acceptability for uncooked rice. Two-kg pack of assorted Korean rice varieties were distributed to farmer- participants after the Field Day for testing in their own respective farms

- Partnership with Korea Saemaul Rice (KoSR) and Pangasinan Rice Processing Complex (PRPC) were forged for the processing and marketing of Milyang 23. Since Korean variety is a product of crossing Indica and Japonica rices, the resulting variety such as Milyang 23 has difficulty finding its way to Filipino rice consumers.

- Conducted Rice S&T updates and specialized training course for farmers who are interested to test the Korean varieties. Thirty five (35) participants from the different municipalities of Tarlac, Pangasinan and Nueva Ecija were invited and trained. The average knowledge gained by the participants is 25.8%.

- For WS2016 expansion sites, a total of 890kg of Korean variety seeds were distributed in Tarlac, Nueva Ecija, Ilocos Norte, Isabela, Iloilo and Cagayan. For DS 2016, 560kg of Korean seeds were distributed in seven (7) new sites in Tarlac and Nueva Ecija, planting a total of 12.47ha.

- Two (2) Farmers' Field days were conducted for WS 2016, one (1) in Gen. Mamerto, Natividad, Nueva Ecija and one (1) in San Clemente, Tarlac. Around 400 farmer- participants were present during the said Field days.

- A total of 96 bags (20kg each) of Milyang 23 were released for cluster production by DS 2017. Forty (40) bags were awarded to Mayantoc farmers' group in Tarlac and 56 bags toCuyapo farmers' association.

Figure 13. Activities conducted: (a) Farmers' Field day in Brgy. Paitan Norte, Cuyapo, Nueva Ecija and (b) Field visit with Dr. Kim Sang Hwa.

XII. Reducing Risks and Raising Rice Livelihoods in Southeast Asia through the Consortium for Unfavorable Rice Environment (CURE2) – Drought Component

AM Corales and RC Santos

Over the years, yield levels in irrigated farms in the country had been consistently increasing but yields in the rainfed areas are still unstable. Development efforts however, had been focused on the promotion of irrigated rice varieties in key potential areas but promotion of rainfed rice varieties was not given much attention. Thus, improving rice harvests in the rainfed area is crucial in boosting the country's total rice production.

PhilRice and IRRI have been working together to help mitigate problems in rainfed areas by developing and promoting drought-tolerant rice varieties and best management practices. Through the second phase of this project, various activities and approaches are being employed to enhance the validation, testing, wider promotion, and adoption of drought-tolerant technologies.

Activities:

- Establish linkage with DA-RFO 1, LGUs, OPAg, and Local Farmer Technicians projects and stakeholders for seed multiplication, distribution, promotion and technical assistance provision.
- Establish on-farm demonstrations highlighting 4 drought- tolerant rice varieties.
- Conduct capacity enhancement activities such as S&T Updates and Season- Long Farmer Field School for farmer-leaders and LGU partners.

- Conduct Farmers' Field Day and Forum to showcase drought-tolerant technologies and promote knowledge sharing Conductquarterly assessments/ reviews to determine the status of project activities.
- Conduct field measurements, monitoring and evaluation.

Results:

- Established partnership with the Department of Agriculture-Regional Field Office 1 Local Governments of Tarlac and Nueva Ecija, Ilocos Norte Research and Experiment Center, Pangasinan Research and Experiment Center, Pangasinan State University, Cagayan State University and Rice Program Coordinators.
- Established 44 LFT-managed demonstration fields in rainfed lowland and 4 demonstration fields in the rainfed upland for variety promotion and seed multiplication of drought-tolerant varieties in Region 1.
- 49 season-long Farmer Field Schools successfully conducted with emphasis on drought-tolerant technologies participated in by 25 to 35 farmer participants per FFS. The FFS achieved a total of 1,406 participating farmers for a period of 16 weeks through the combined efforts of LGU partners, DA-RFO1, Rice program coordinators in Regions 1 and 3 and the project staff.
- One Rice Science & Technology update was conducted for 52 farmer-leaders and agricultural extension workers (AEWs) on March 10, 2016 at PhilRice Central Experiment Station in Nueva Ecija. The activity aimed to provide awareness among participants on several "sahod-ulan" varieties that are already available for commercialization and to forge collaboration with LGU-AEWs for the expansion of project coverage in Region 3 for wet season 2016.
- Four (4) additional S&T Updates were conducted focusing on dry direct seeding technology and disease diagnosis participated in by 116 local farmer technicians (LFTs) and LGU partners in Region 1. PhilRice and DA-RCPC staff served as resource persons for the one- day activity.
- Completion of area measurement and site geographic location using Global Positioning System (GPS) and mapping using Geographic Information System (GIS) covering all project sites in Regions 1 and 3.

- Two (2) multi-purpose seeder demonstrations were also conducted in Ventinilla, Paniqui, Tarlac and Umingan, Pangasinan which was attended by LGU-partners and 51 farmer- participants.

- For wet season 2016, 3,860 kg of sahod-ulan seeds were distributed to 172 farmer-cooperators in Nueva Ecija, Tarlac, Pangasinan, La Union, Ilocos Sur and Ilocos Norte through "Lakbay-Binhi".

- Technical briefings were conducted before seed distribution in Pangasinan with 38 pax, La Union with 16 pax, Ilocos Sur with 14 pax, Ilocos Norte with 28 participants, and Nueva Ecija 20 pax.

- Project assessment and review conducted in Sual, Pangasinan, San Fernando, La Union and Batac, Ilocos Norte participated in by the project partners in Region 1. Reporting of LFTs on the activities conducted, raising and responding on the issues and concerns are the major highlights of the event.

- For WS 2016, eight new rice varieties (NSIC Rc416, Rc418, Rc420, Rc422, Rc424, Rc426, Rc428, Rc430) with traits to endure drought were planted in the learning farm at PhilRiceCES and was showcased during the institutional field day. Similarly, these eight drought tolerant rice varieties were distributed to the farmer-partners in Paniqui, Tarlac to test for theirgrain and yield stability.

- The 11.16 hectares planted with Sahod-Ulan varieties during dry season 2016 obtained an average yield of 7.41t/ha (NSIC Rc346), 7.05t/ha (NSIC Rc280), 6.54t/ha (NSIC Rc282) and 4.84 t/ha (NSIC Rc348). As for the yield performance per municipality as shown in Figure 14, Cuyapo, Nueva Ecija obtained the highest yield of 6.97t/ha, followed by Gerona, Tarlac with 6.84t/ha, Victoria, Tarlac, 6.60t/ha, Ramos, Tarlac 6.64t/ha, Pura, Tarlac 6.32t/ha, Paniqui, Tarlac 6.19t/ha and 4.86t/ha in Nampicuan, Nueva Ecija.

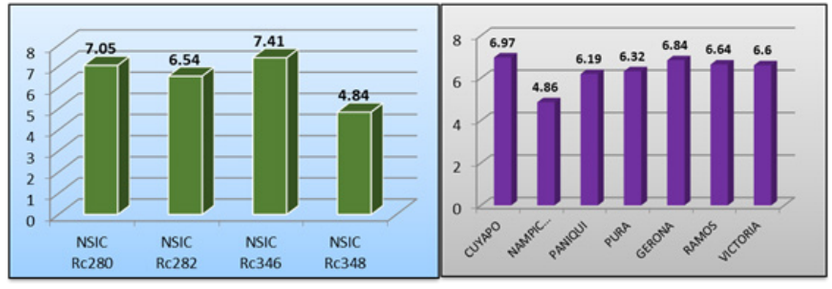

Figure 11. Yield performance by variety, by municipality, DS 2016.

Figure 12. Activities conducted: (a) Farmers' Field day and Forum; (b) Techno-demo field; (c) Lakbay Binhi; and (d) Farmers Field School.

XIII. Enhancing the Capacity of Production and Distribution of High-Quality Rice Seed

TL Briones, AM Corales, JV Pascual, MP Capistrano, SC Jin, GDMartin, GM deGracia, JU Ramos

In support to the rice self-sufficiency target, PhilRice has developed and released more than 30 rice varieties with superior characteristics such as better yield performance, resistance to pest and diseases, resistance to environmental or abiotic stresses and good eating quality. Despite these good traits, unavailability and unreliable supply hinder adoption of good quality rice seeds with the majority of rice farmers still using home-saved seeds.

Both experimental and farmers' survey data show that there is a yield advantage in using higher quality seeds that can contribute 15% increase in yield. With this, the Korea International Cooperation Agency (KOICA) and Philippine Rice Research Institute (PhilRice) forged partnership to help contribute to the attainment and sustainability of the national rice self-sufficiency goal through the provision of high quality seeds and increase of its adoption in Nueva Ecija and Pangasinan.

Activities:

- Establish partnership and linkage with farmer-partners and other stakeholders for the promotion and distribution of high quality rice seeds.
- Distribute seeds of preferred varieties by farmers in Nueva Ecija and Pangasinan.
- Conduct field monitoring and evaluation and consultation meetings with farmer-partners to discuss some issues and concerns in the implementation of the project.
- Conduct capacity enhancement activities necessary in the successful implementation of the project.

Results:

- For DS 2016, the farmer-recipients in Parista BDS-MPC in Lupao, Nueva Ecija achieved an average yield of 75 bags or 4.2t/ha, despite having problems on irrigation. They achieved 100% repayment from the seed capital which they used to procure 96 bags of certified seeds (CS) for wet season planting. The mark-up price from seeds was used to procuree additional 13 bags of rice seeds for farmer-recipients. The Guiset Organic Farmers Coop members in Guimba, Nueva Ecija also achieved 100% repayment of the seed capital including the remaining 25% balance from WS 2015. They achieved an average yield of 109 bags/ha or 6.1 t/ha, despite the incidence of brown plant hoppers (BPH). The collection from the repayment of seeds was used to procure 100 bags of CS for the new 30 farmer-beneficiaries for WS 2016 planting.
- Two hundred sixty seven (267) bags or 10.68 tons of certified seeds were distributed to 72 farmers of two new identified and established sites, Pinagbuklod na Adhika Credit Cooperative in Macarse, Zaragosa and Nag-iisang Masikap Primary Multi-Purpose Cooperative in Balangkare Norte, Gen. Natividad of Nueva Ecija for WS 2016 cropping.
- For wet season 2016, expansion sites were established in Zaragosa and Gen. Natividad, Nueva Ecija and in Mangatarem, Sual and Alaminos City, Pangasinan in partnership with the Bureau of Plant and Industry- National Seed Quality and Control Services (BPI-NSQCS) Regions 1 and 3, Department of Agriculture- Regional Field Offices (DA-RFO 1&3), Office of Provincial Agriculturist and Local Government Units (LGUs) of Nueva and Pangasinan.
- Project launching and signing of the memorandum of agreement (MOA) was conducted in Macarse, Zaragosa and Balangkare Norte, Gen. Natividad, Nueva Ecija with the partner-cooperatives namely: Pinagbuklod na Adhika Cooperative and Nag-iisang Masikap PMPC, respectively.
- In Pangasinan, the project was launched in Mangatarem with three (3) farmer-associations namely: Mabalacat Farmers Communal IA, Bantay Mangatarem Farmers IA, and Buenlag Farmers IA. In Alaminos City, partnership was established with the two (2) farmer-associations namely: Alos-Conconig Farmers IA and Paed Limaquita IA; and four (4) farmer-groups in Sual, Pangasinan namely: Paitan East FIA, Maicawa FIA, Victoria FIA and Calupani FIA.
- Two hundred thirty four (234) farmer-members were selected in Pangasinan from the nine organizations in Sual, Alaminos City and Mangatarem as recipients of the quality seeds from the project. Ninety (90) bags CS were distributed in Sual, 100 bags CS in Alaminos and 100 bags in Mangatarem (Table 6), with their preferred varieties such as NSIC Rc160, Rc216 and Rc308. Before the seed distribution, technical briefing was conducted in each project site to enhance the awareness of

farmer beneficiaries on latest practices and technologies in rice production.

- Series of technical briefings were conducted during the critical growth stages of rice crop to help farmers address their location-specific field problems. Mapping of farm location, regular monthly field monitoring, and consultation with the partner-organizations were done to ensure smooth implementation of the project in the site.
- After WS2016 cropping, farmer's field day and forum was conducted for each site. The program was attended by farmer-beneficiaries, and neighboring farmers, representatives from project partners such as the Bureau of Plant Industry- National Seed Quality Control Services (BPI-NSQCS) of Regions 1 and 3, Department of Agriculture- Regional Field Offices (DA-RFO 1&3), Office of Provincial Agriculturist and Local Government Units (LGUs) of Nueva and Pangasinan.

Table 5. Seeds distributed in Nueva Ecija.

Sites/Coops	No. of Farmer-Recipients	No. of bags distributed	Varieties	Yield (in bags)	Repayment (%)
Guimba, Nueva Ecija: **Guiset Organic Farmers' Credit Cooperative**	WS 2015 30 farmers	100	PSB Rc18/ NSIC Rc222	Range: 36 - 100 bags Ave: 62 bags / 3.47 t/ha*	75% P 102,000
	DS 2015-2016 33 farmers	75	NSIC Rc222 NSIC Rc308	Range: 65-130 bags Ave: 109 bags - 6.1 t/ha	100% +25% P 136,000
	WS 2016 30 farmers	100	NSIC Rc222/NSIC Rc216/ NSIC Rc218/ NSIC Rc308/PSB Rc18/ PSB Rc10	Range: 60-90 bags Ave: 74 bags - 4.14 t/ha***	----
Lupao, Nueva Ecija: **Parista BDS Multi-Purpose Cooperative**	DS 2016 36 farmers	83	NSIC Rc222/ NSIC Rc308	Range: 60-116 bags Ave: 75 bags - 4.2 t/ha**	100% P 112,880
	WS 2016 39 farmers	96	NSIC Rc222/NSIC Rc308/ NSIC Rc216	Range: 75-120 bags Ave: 94 bags - 5.26 t/ha***	----
Zaragoza, Nueva Ecija: **PInagbuklod na Adhika Credit Cooperative**	WS 2016: 34 farmers	132	NSIC Rc222/ NSIC Rc160	Range: 30-80 bags Average: 48.8 bags - 2.73t/ha***	----
Gen. M. Natividad: **Nag-iisang Masikap Primary Multi-Purpose Cooperative**	WS 2016 38 farmers	135	NSIC Rc222/ NSIC Rc216	Range: 60-120 bags Ave: 90 bags - 5.04 t/ha***	----

*Some of the crops were damaged by brown plant hopper (BPH)
* WS 2016 repayment (on-going)
**Some fields experienced limited water supply
***Damaged/ affected by typhoon Karen and Lawin

Table 6. Seeds distributed in Pangasinan.

Municipality	Farmer's Organization	No. of Farmers	No. of Seed Distributed				Area Planted
			NSIC Rc216	NSIC Rc160	NSIC Rc308	TOTAL	
Sual	Paitan East Farmer AI	13	9	11	----	20	20
	Maicawa Farmer AI	20	11	9	----	20	20
	Victoria Farmer AI	20	11	14	----	25	25
	Calupani Farmer AI	25	14	11	----	25	23.5
	Subtotal	**78**	**45**	**45**	**----**	**90**	**88.5**
Alaminos	Paed Limaquita IA	39	31	19	----	50	50
	Alos Conconig Farmers IA	48	37	13	----	50	50
	Subtotal	**87**	**68**	**32**	**----**	**100**	**100**
Mangatarem	Mabalacat Farmers Communal IA	48	32	25	14	71	70
	Bantay Mangatarem Farmers IA	12	1	14	2	17	16
	Buenlag Farmers IA	9	8	----	4	12	12
	Subtotal	**69**	**41**	**116**	**20**	**100**	**98**
Total	**234**	**154**	**116**	**20**	**20**	**290**	**287**

XIV. Capacity Development for Climate-Change Resilient ARC

AV Antonio

The Department of Agrarian Reform's (DAR) primary mission is to alleviate the economic status of the farmer beneficiaries of the Comprehensive Agrarian Reform Program (CARP). With this goal, the DAR has adopted the Agrarian Reform Community development strategy wherein ARBs and their organization are envisioned to sustainable rural development and are able to operate and manage their own enterprise. It is a holistic approach wherein land distribution is coupled with effective delivery of support services and necessary interventions in order to increase production and improve household income.

Nowadays, the beneficiaries of CARP face greater risks in farm productivity and income posed by the El Niño phenomenon and the recurrence of flooding and strong typhoons. The government has to take pro-active steps in assisting farmers in climate change mitigation and adaptation strategies to minimize the damage to lives, property and livelihood. This was done through partnership with the Philippine Rice Research Institute, a chartered government corporate entity under the Department of Agriculture created to help develop high yielding, cost-reducing, and environment-friendly technologies so farmers can produce and sustain higher yield and income. Strategies done to achieve the objectives of the project are training of farmer-leaders, establishment of technology demonstration farms, conduct of monthly agri-kwentuhan in the area, conduct of field day, and field tour to PhilRice.

Activities:

- Conduct of training and agri-kwentuhan, establishment of technology demonstration, and implementation of field day, and study tour for farmers.

Results:

A. Training Component

- A total of (26) participants attended the training on "Capacity Development on Climate Change-Resilient ARC" held at the Philippine Rice Research Institute, Science City of Munoz, Nueva Ecija on February 15-19, 2016. Most of the participants came from Calumpit (9) and Paombong (9). Others came from Malolos (4), Hagonoy (3), and Plaridel (1).

- The knowledge gained by the participants was evaluated through the pretest and posttest. Gain in knowledge after the training was 21%.

- Most of the participants rated the whole training course as "Excellent". Specifically, training evaluation such as Adequacy of course content (4.77) Sequencing and organizing of subject matter (4.81), Time management (4.85), Sufficiency of training materials (4.69), Use of audio-visuals (4.46), Supervision and management of training course (4.85), Facilitators (4.96), and Resource persons (4.96) were rated excellent. Only the Instructional materials used (4.23), and Dormitory (4.27) were rated "Very Good".

B. Technology Demonstration Component

- Three Participatory Technology Demonstration (PTD) Farms on nutrient management, pest management, seed production, and varietal demo were established in Paombong (1) and Calumpit (2), Bulacan.

- Average yield resulted in the Seed Production demo using NSIC Rc238 was 6 tons/ha. Data gathered in Varietal demo showed that NSIC Rc392 exhibited the highest yield followed by NSIC Rc358, NSIC Rc360, NSIC Rc27 while NSIC Rc192 gave the lowest yield.

- PTD on Pest Management showed that IPM manage field has 666kg or 13 cavan advantage compared to farmers practice. The average farmer practice field has additional cost of 540 pesos compared to IPM manage field because of the use of insecticide. The IPM field has average net income of PhP55, 034.80 pesos, while the farmers practice field has lower net income of PhP44, 877.63.

- PTD on Nutrient Management showed that higher yield was obtained in MOET field (6,373.3kg) compared to Farmers practice field (5,633.3kg). The fertilizer cost was lower in MOET field by 805 pesos compare to farmers practice field. The increase in yield and reduction of fertilizer cost has resulted to higher net income in MOET by PhP10,715.6 pesos compared to farmer's practice field.

C. Agri-Kwentuhan Component

- A regular monthly meeting of all the participating farmers participating of the project was conducted as Agri-kwentuhan strategy. A total of seven meetings (November 9, January 15, February 12, March 22, April 22, August 31, and December 9) were conducted in Brgy. Kapitangan, Paombong, Bulacan. This was done to address the current problems and needs of the farmers, monitor farmers' field especially those with field problems, and conduct of post-harvest review and evaluation.

- A participatory norm setting was done at the start of the first monthly meeting and the output served as guide on the setting of venue and time, attendance and punctuality of the farmers and other aspects that are necessary in the conduct of the meeting. Activities included field visits, discussion of especial topics needed by farmers, evaluation and planning.

D. Study tour

- A total of forty five (45) farmers from ARC sites of Bulacan participated in the cross visit or "Lakbay Palay" at PhilRice Central Experiment station on April 1, 2016. Farmers were given the opportunity to see and learn from the experiments/projects at PhilRice. They were also given the opportunity to participate in the "Open Forum" with the Secretary of Agriculture, Secretary Proceso Alcala and other researchers and leaders of PhilRice.

E. Farmer's Field Day and Forum

- A Farmers' field day and forum was done on May 3, 2016 at Barangay Bulusan, Calumpit, Bulacan which was attended by (105) farmers and extension agents from PhilRice, DAR, and DA-LGU of Calumpit, Bulacan. The field day highlighted the field demonstrations on varieties, , seed production, nutrient management, and pest management. An open forum was also done to answer questions of non-participating farmers who attended the activity.

Figure 25. Activities conducted: (a) Training; (b) Techno Demo; (c) Agri-kwentuhan; (d) Field Tour to PhilRice; (e) Farmers' Field Day and Forum; and (f) Group picture.

Abbreviations and acronymns

ABA – Abscicic acid
Ac – anther culture
AC – amylose content
AESA – Agro-ecosystems Analysis
AEW – agricultural extension workers
AG – anaerobic germination
AIS – Agricultural Information System
ANOVA – analysis of variance
AON – advance observation nursery
AT – agricultural technologist
AYT – advanced yield trial
BCA – biological control agent
BLB – bacterial leaf blight
BLS – bacterial leaf streak
BPH – brown planthopper
Bo - boron
BR – brown rice
BSWM – Bureau of Soils and Water Management
Ca - Calcium
CARP – Comprehensive Agrarian Reform Program
cav – cavan, usually 50 kg
CBFM – community-based forestry management
CLSU – Central Luzon State University
cm – centimeter
CMS – cystoplasmic male sterile
CP – protein content
CRH – carbonized rice hull
CTRHC – continuous-type rice hull carbonizer
CT – conventional tillage
Cu – copper
DA – Department of Agriculture
DA-RFU – Department of Agriculture-Regional Field Units
DAE – days after emergence
DAS – days after seeding
DAT – days after transplanting
DBMS – database management system
DDTK – disease diagnostic tool kit
DENR – Department of Environment and Natural Resources
DH L– double haploid lines
DRR – drought recovery rate
DS – dry season
DSA - diversity and stress adaptation
DSR – direct seeded rice
DUST – distinctness, uniformity and stability trial
DWSR – direct wet-seeded rice
EGS – early generation screening
EH – early heading
EMBI – effective microorganism-based inoculant
EPI – early panicle initiation
ET – early tillering
FAO – Food and Agriculture Organization
Fe – Iron
FFA – free fatty acid
FFP – farmer's fertilizer practice
FFS – farmers' field school
FGD – focus group discussion
FI – farmer innovator
FSSP – Food Staples Self-sufficiency Plan
g – gram
GAS – golden apple snail
GC – gel consistency
GIS – geographic information system
GHG – greenhouse gas
GLH – green leafhopper
GPS – global positioning system
GQ – grain quality
GUI – graphical user interface
GWS – genomwide selection
GYT – general yield trial
h – hour
ha – hectare
HIP - high inorganic phosphate
HPL – hybrid parental line
I - intermediate
ICIS – International Crop Information System
ICT – information and communication technology
IMO – indigenous microorganism
IF – inorganic fertilizer
INGER - International Network for Genetic Evaluation of Rice
IP – insect pest
IPDTK – insect pest diagnostic tool kit
IPM – Integrated Pest Management
IRRI – International Rice Research Institute
IVC – in vitro culture
IVM – in vitro mutagenesis
IWM – integrated weed management
JICA – Japan International Cooperation Agency
K – potassium
kg – kilogram
KP – knowledge product
KSL – knowledge sharing and learning
LCC – leaf color chart
LDIS – low-cost drip irrigation system
LeD – leaf drying
LeR – leaf rolling
lpa – low phytic acid
LGU – local government unit
LSTD – location specific technology development
m – meter
MAS – marker-assisted selection
MAT – Multi-Adaption Trial
MC – moisture content
MDDST – modified dry direct seeding technique
MET – multi-environment trial
MFE – male fertile environment
MLM – mixed-effects linear model
Mg – magnesium
Mn – Manganese
MDDST – Modified Dry Direct Seeding Technique
MOET – minus one element technique
MR – moderately resistant
MRT – Mobile Rice TeknoKlinik
MSE – male-sterile environment
MT – minimum tillage
$mtha^{-1}$ - metric ton per hectare
MYT – multi-location yield trials
N – nitrogen
NAFC – National Agricultural and Fishery Council
NBS – narrow brown spot
NCT – National Cooperative Testing
NFA – National Food Authority
NGO – non-government organization
NE – natural enemies
NIL – near isogenic line
NM – Nutrient Manager
NOPT – Nutrient Omission Plot Technique
NR – new reagent
NSIC – National Seed Industry Council
NSQCS – National Seed Quality Control Services
OF – organic fertilizer
OFT – on-farm trial
OM – organic matter
ON – observational nursery
OPAg – Office of Provincial Agriculturist
OpAPA – Open Academy for Philippine Agriculture
P – phosphorus
PA – phytic acid
PCR – Polymerase chain reaction
PDW – plant dry weight
PF – participating farmer
PFS – PalayCheck field school
PhilRice – Philippine Rice Research Institute
PhilSCAT – Philippine-Sino Center for Agricultural Technology
PHilMech – Philippine Center for Postharvest Development and Mechanization
PCA – principal component analysis
PI – panicle initiation
PN – pedigree nursery
PRKB – Pinoy Rice Knowledge Bank
PTD – participatory technology development
PYT – preliminary yield trial
QTL – quantitative trait loci
R - resistant
RBB – rice black bug
RCBD – randomized complete block design
RDI – regulated deficit irrigation
RF – rainfed
RP – resource person
RPM – revolution per minute
RQCS – Rice Quality Classification Software
RS4D – Rice Science for Development
RSO – rice sufficiency officer
RFL – Rainfed lowland
RTV – rice tungro virus
RTWG – Rice Technical Working Group
S – sulfur
SACLOB – Sealed Storage Enclosure for Rice Seeds
SALT – Sloping Agricultural Land Technology
SB – sheath blight
SFR – small farm reservoir
SME – small-medium enterprise
SMS – short message service
SN – source nursery
SSNM – site-specific nutrient management
SSR – simple sequence repeat
STK – soil test kit
STR – sequence tandem repeat
SV – seedling vigor
t – ton
TCN – testcross nursery
TCP – technical cooperation project
TGMS – thermo-sensitive genetic male sterile
TN – testcross nursery
TOT – training of trainers
TPR – transplanted rice
TRV – traditional variety
TSS – total soluble solid
UEM – ultra-early maturing
UPLB – University of the Philippines Los Baños
VSU – Visayas State University
WBPH – white-backed planthopper
WEPP – water erosion prediction project
WHC – water holding capacity
WHO – World Health Organization
WS – wet season
WT – weed tolerance
YA – yield advantage
Zn – zinc
ZT – zero tillage

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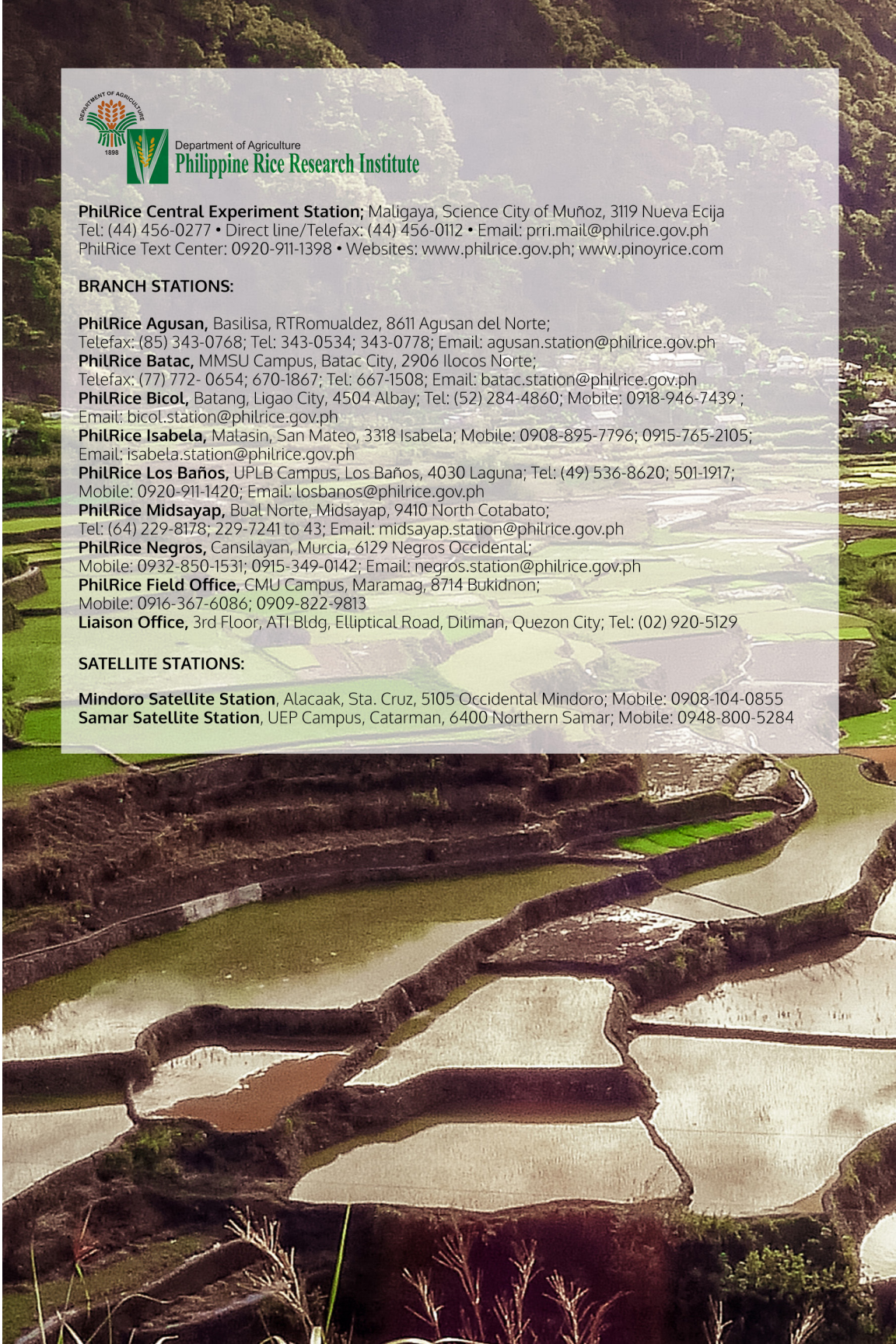

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