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RICE SEED SYSTEMS PROGRAM

Contents

PROGRAM

Rice Seed Systems

Program leader: Glenn Y. Ilar

Executive Summary

The Rice Seeds Systems Program (RSSP) ensures that adequate volume of high-quality seeds (HQS) of different classes and types (ie. breeder, foundation, registered, and certified classes; inbred and hybrid) are produced, accessed, and distributed through the formal and/or informal systems. The RSS Program contributes to the Institute's outcomes on: (1) increased productivity, cost-effectiveness, and profitability of rice farming in a sustainable manner; (2) enhanced value, availability, and utilization of rice, and by-products for better quality, safety, health, nutrition, and income; (3) science-based and supportive rice policy environment; and (4) advanced rice science and technology as continuing sources of growth. To achieve its goal, this Program implemented projects that cover both inbred and hybrid rice, and are implemented across PhilRice stations.

This 2019, the PhilRice branch stations gathered baseline information on the supply and distribution of HQS in the areas and identify bottlenecks to help develop and improve their local rice seed systems, and established technology demonstration farms to increase awareness on using HQS and help ensure that seeds of farmers' preferred rice varieties are available, accessible, and affordable. For PHRSS, the targeted seed production of 750kg A/S lines and 100kg R/P-lines breeder seeds was attained. The targeted production of 3,000kg P-line, 1,500kg A line, and 500kg R line foundation seeds of the M1 and M20 parentals achieved at least 400% except for S line FS, which realized 71.31% of the targeted 9,000kg. Two public hybrids developed by PhilRice, the M55 (3-line) and M73 (2-line) were identified as next in line for commercialization owing to its high yield and good eating quality. Retooling on hybrid rice seed production especially on the production of 2-line hybrids was conducted to 25 deputized seed inspectors from Luzon. To demonstrate the performance of the public hybrids and increase awareness on hybrid rice technology, 10 technology demonstrations were established in PhilRice branch stations and in National Rice Technology Forum (NRTF) sites organized by the Rice Board, and seven provincial hybrid rice derbies were participated.

Two guidelines on the (1) storage of and access to nucleus and breeder seeds at the PhilRice Genebank (AO 2019-004), and (2) distinctness, uniformity, and stability test (DUST), and nucleus and breeder seed production at PhilRice (AO 2019-005) were issued and institutionalized. In addition, some of the

suggestions of the previous assessments conducted in 2018 were implemented such as the regular rouging at critical stages of the rice crop, and harvesting, threshing, drying, and cleaning at the right time. All these have contributed to the improved seed production efficiencies with an average 90.7% and 93% for 2018 DS and 2019 DS, respectively, for Registered Seed at the Business Development Division (BDD) in CES and branch stations. Nine location-specific adaptability trials (LSATs) cum seed production were established in Region 3, and 19 techno-demos of nationally-recommended varieties and newly-released 400 and 500-series varieties were established also in CES, branch stations, and the project sites. From these LSAT sites, 13 farmers have signified to become accredited seed growers, in addition to the previously identified three farmers from Aurora, Bataan, and Zambales. The Rice Seed Distribution Information System developed last year was already beta tested in CES, Isabela, and Batac, which is ready for deployment in 2020. In addition, the Rice Seed Traceability System for nucleus to breeder seeds is now being developed.

To address availability, accessibility, affordability of public hybrids, the presence of public hybrids in the market must be maintained. The basic seed production (NS and BS) and pre-commercialization activities will still be handled by the program, while the FS seed production and marketing are recommended to be handled by the BDD. Moreover, the BDD should take a more proactive role in marketing the public hybrids for increased adoption. For inbred rice, the improved production and post-production protocols must be strictly enforced to enhance seed production efficiencies. Consequently, the needed infrastructure and facilities to maintain seed quality must be established such as the installation of shallow tube wells and pumps to allow earlier crop establishment and ensure readily available water when needed. This will also allow the timely availability of FS and RS to PhilRice clients. To increase seed yield and reduce fertilizer cost in seed production, the adoption of the MOET kit or the MOET App as a tool in nutrient management in all BDD seed production plots was encouraged. Moreover, the establishment of LSATs should be continued to identify location-specific varieties and help in making HQS available at the farmers' level. The benchmark studies should be continued by all branch stations to identify gaps and constraints in the production and supply of HQS to help improve the rice seed system in their areas of coverage. In addition, the Rice Seed Information System being developed must be fast tracked and integrated to the systems developed for RSSP, RSIS, and RCEF to encompass the whole rice seed value chain. Through these, the issues of seed production traceability, distribution monitoring, and seed demand forecasting are addressed.

Assessment/Improvement of Seed Production Protocols and Postharvest Operations

SR Brena, AOV Capistrano, JJE Aungon, and RC Ramos

The project is composed of three studies, namely: 1) Evaluation of the Current Rice Seed Production Systems in CES and Branch Stations; 2) Enhancing Rice Seed Production in all PhilRice Branches Through Adoption of the MOET Kit and MOET App Technologies; and 3) Ensuring Genetic Purity and Assessing Seed Quality After Harvest and During Storage in CES and Branch Stations.

In the improved protocol, it is emphasized that seeds produced at PhilRice can be made available in 30 days after harvest provided all equipment and logistics are available. Included among the suggested improvement is the installation of shallow tube wells in CES and branch stations for irrigation water to be readily available because sometimes release of water by NIA is delayed. Assessment on the seed operation at PhilRice identified improvements on the drying of freshly threshed seeds, submission of seed sample by the seed inspector, and the seed testing by BPI-NSQCS of the sample submitted. Drying was completed in less than 5 days. Sample submission was done in 3-4 days, and seed testing was completed in 9-12 days. The main bottleneck in the entire operation was cleaning of seeds after drying, which takes more than 10 days, resulting in the delayed seed sampling by the seed inspector and possible effect on the quality of the seeds. This operation can be addressed easily with the available seed cleaners in CES and stations and proper scheduling of seed operations by the seed production in-charge such that the required 5-7 days for seed cleaning after drying is followed.

Moreover, average RS production efficiency was 90.7% in 2018 and 93% in 2019. The study on the use of MOET was conducted in several stations in 2019 with 40 MOET tests and 29 field trials in CES, Agusan, Negros, and CMU. The MOET trials in these stations were compared with the blanket nutrient application employed by BDD. Of the 24 MOET technology field trials, 18 have a yield advantage of 0.43t/ha in the DS and 0.25t/ha in the WS against the conventional fertilization practice of the BDD on seed production. Positive results were achieved by 19 varieties in the analysis of the yield performance and fertilizer productivity. There was no significant difference noted in the seed germination and moisture content analysis done by the BPI-NSQCS between the use of MOET recommendation and the BDD blanket application after 10 months of storage.

However, it was observed, that the extended storage of seeds for 10 months, regardless of seed warehouse resulted in seed deterioration. Meanwhile, assessment on the viability and seed vigor of seeds produced in 2018 DS and WS were done every three months. Results showed that seed viability was still higher than 85% after nine months except in PhilRice-Los Baños (80%). However, after 12 months, decreased viability was observed in different stations; 83% in CES, 61% in Bicol, 47% in Negros, and 1% in Isabela. The decline in seed viability was due to high incidence of storage insect pests such as weevils. Based from the results, it can still be recommended to store the seeds for six months for WS harvest and about nine months when produced in DS. Hence, it is safe to store seeds for six months regardless of season since new harvest will be available in 4-6 months after the seeds are tagged and stored.

Enhancing the Production and Promotion of High-Quality Inbred Rice Seeds

RA Pineda, MJ Manalang, AJC Castaneda, RG Zagado, CA Frediles, FM Saludez, and DCP Corpuz

The project developed options or strategies for effective rice seed system development for the rapid deployment of high-quality seeds (HQS) of new and/or recommended inbred rice varieties at the farm level. The strategies identified to enhance the production and promotion of HQS in areas with no or limited number of seed growers include: 1) capacity enhancement of farmers on the production of high-quality inbred rice seeds, 2) establishment of location-specific adaptability trials cum seed production, and 3) implementation of strategic communication interventions. These activities allowed the production and supply of preferred rice varieties of farmers for HQS to become available, accessible, and affordable. These strategies will greatly contribute to increased production, promotion, and adoption of high-quality inbred rice seeds. With increased awareness on the benefits of using high-quality inbred rice seeds, and enhanced knowledge in producing HQS, farmers can save production costs, increase yields, and have seed security for the next cropping seasons.

To complement RCEF implementation, the capacity building activities focused on providing extension support to RCEF project areas especially on increasing the utilization of high-quality inbred rice seeds. Eight batches of training of trainers (TOT) for Agriculture Extension Workers (AEWs), farmer leaders, local farmer technicians (LFT), and farmers were conducted with 210 participants (127 males and 83 females). The TOT will enhance the capacity of the regional/local teams to train more rice farmers on the production of high-quality inbred rice seeds. Further, Modified Farmers Field Schools (MFFSs) were conducted in Aurora (3MFFS), Bataan (3 MFFS), and Zambales (3 MFFS) and attended by 195 farmers (149 males and 46 females), who are now producing their own HQS.

For 2019 DS, the project established 3.5ha technology demonstration farms (TDF) in six location specific adaptability trial sites or LSATs and 7.16ha TDF in 2019 WS in eight LSAT sites. The TDFs served as learning fields for the nine MFFSs on High-Quality Inbred Rice Seed Production. Meanwhile, Farmers Field Days and Fora were conducted in five LSAT sites to showcase the performance of the newly-released, and the nationally- and regionally-recommended rice varieties and eventually identified best adaptable varieties in the areas or locality. The field days were attended by 447 farmers (280 males and 167 females) from Aurora, Bataan, and Zambales.

Local seed production across sites marketed 57 bags (@40kg/bag) of high-quality seeds to 36 farmers in 2019 DS. In 2019 WS, 30 bags of NSIC Rc 218 was sold by the trained local seed producers to 25 farmers in Mariveles, Bataan. Similarly, 60 bags of NSIC Rc 218 and 30 bags of NSIC Rc 160 in Casiguran, Aurora; and 58 bags of NSIC Rc 218 in Bagac, Bataan were sold to the farmers.

Eight types of knowledge products (KPs) promoting the use of HQS were distributed to 300 farmers in the RSS sites in Bataan, Aurora, and Zambales. Also, three new KPs were developed and distributed. Seven radio segments about high-quality seeds and its production were also produced and aired 42 times in Nueva Ecija, Pampanga, Pangasinan, Tarlac, Isabela, Aurora, Bulacan, Zambales, Davao Occidental, Davao del Sur, Davao Oriental, and Saranggani, benefitting thousands of farmers. In addition, 10 broadcast releases were produced and aired 53 times in radio program segments. These were also sent to 81 PhilRice media partners for publication. Moreover, 6,164 messages on rice seed systems, specifically on the benefits of using high-quality seeds, were responded to using the PhilRice Text Center. To take advantage of the huge benefits of using the social media, 33 posts with 12,859 average reach per post were posted in the Facebook account of PhilRice. From these, there were 295 reactions, 54 average shares; and 30 average comments. Based on the average reach, reactions, shares, and comments, the 2019 contents gained more engagements than 2018.

All these accomplishments helped and contributed to the faster distribution and utilization of high-quality rice seeds of different varieties at the farmers level.

PROJECT 3

Development of Rice Seed Information System

AC Arocena Jr., LSS Doronio, HC Cayaban, JP Gamilla, RD Rimando Jr., and AF Valenton

The project aimed to establish an effective nationwide electronic seed information system for the major stages of the rice seed chain (production, post production processing and storage, and distribution) using the commonly available information infrastructures to facilitate data collection, data transfer, feedback, and monitoring for rice seeds in the Philippines. This system is envisioned to provide a common communication venue where seed growers and farmers can post their preferred variety for their future cropping, which can be monitored by PhilRice for better planning. It will help farmers, decision makers, and other government planners in strategizing a more efficient seed distribution and positioning plans. To realize these objectives, two components were implemented under the project: (1) development of the seed distribution monitoring system, and (2) development of the seed production traceability information system.

In 2019, the project developed a database system to support data collected through the seed distribution pathway. A database structure was established for the farmer/seed grower questionnaire, a user interface for encoding, and analytics dashboard for monitoring and viewing activity/data turnout. To monitor the purchases and production area of seed growers, the seed distribution monitoring systems, the seed grower's app, and the seed ordering through the 'Kiosk' were integrated to the BDD-IS. This will help the intended users monitor the availability of rice seeds in certain areas.

PROJECT 4

Public Hybrid Rice Seed Systems

FM Ramos, SR Brena, JS Baldoz, and FP Bongat

The project aimed to develop a strong and sustainable public hybrid rice seeds system (PHRSS) so that high-quality public hybrid rice parentals and F1 seeds will be accessible, affordable, and available at all times. This could be achieved by producing the required volume and quality of nucleus, breeder, foundation, and F1 seeds of commercialized public hybrid rice varieties; validating the performance, grain qualities, and resistance to pests and diseases of pre-commercialized public hybrids; promoting public hybrid rice seed production and cultivation through training, technology demonstration, and communication; and marketing of public hybrid rice parental seeds.
The project consisted of three sub-projects, namely: 1) pre-commercialization, parental seed production, F1 seed production, and monitoring; 2) capacity building and promotion; and 3) marketing of public hybrid rice parental seeds in support for a rice-secure Philippines.

For sub-project 1,988kg BS of A and S lines and 250kg BS of R and P lines were produced and processed to facilitate the production of FS, which will be used by the seed growers. The BS requirements of PhilRice stations particularly Isabela, Negros, and Midsayap were produced and supplied for their FS production. FS produced by PhilRice CES, Isabela, Los Baños, Negros, Mindoro, and Midsayap were 15,618kg S line, 20,281kg P line, 9,435kg A line, and 6,240kg R line. For F1 seed production, 633ha were monitored and supervised in Isabela, Kalinga, South Cotabato, and Davao Oriental. F1 seeds produced in these areas was 490,788kg of Mestizo 1 (M1) and Mestiso 20 (M20). Technical assistance was also extended to the seed producers to ensure the quality and volume of F1 seeds produced. On the other hand, three released public hybrid rice varieties namely: Mestiso 32 (M32), Mestiso 55 (M55), and Mestiso 73 (M73) were evaluated to ensure that there will be new performing public hybrids for the market in the coming seasons. M32 was dropped from the list of pre-commercialized public hybrids as it lodged in some areas when approaching maturity, and had low AxR seed yield and grain yield in some areas. M73 has outstanding performance which can be released for commercialization while M55will be subjected to another season of validation.

For sub-project 2, a five-day training was conducted to 25 public hybrid rice seed inspectors (13 males and 12 females) from Regions 1, 2, 3, 4, and CAR to ensure high quality of the seeds produced by the seed growers. Seventeen techno demo fields were established in the National Rice Technology Forum (NRTF) sites in Pangasinan in 2019 DS and Oriental Mindoro in 2019 WS; in provincial hybrid rice derby sites in La Union, Pangasinan, Ilocos Sur, and Ilocos

Norte in 2019 DS and WS; and at PhilRice stations in Batac, Isabela, Los Baños, Mindoro, Negros, Samar, Agusan, and Midsayap in 2019 WS. Mestiso 20 (M20) was showcased in all NRTF and provincial hybrid rice derby sites both in DS and WS, and in PhilRice stations in WS, while Mestizo 1 (M1) was only showcased during the WS in three derby sites. Eleven field days were conducted in the NRTF and provincial hybrid rice derby sites, and at PhilRice CES. A needs assessment survey was conducted in the hybrid derby sites and NRTF involving 152 men and 76 women farmers as respondents. These activities increased awareness of farmers on the technology, which can eventually lead to adopting public hybrids.

Meanwhile, eight titles of KPs produced in various formats were distributed to 1,287 men and 913 women farmers during exhibits and field days. Also, there were 13 exhibits participated, 21 social media contents produced and posted, six radio interviews conducted, and 13 magazine and website articles published. Of the 2,290 hybrid-related queries received and answered by PhilRice Text Center, only 215 (9%) of the queries and answered are about M1 and M20. These communication interventions helped the stakeholders to have informed decisions in adopting public hybrids. Based on the feedback gathered from farmers on the adoption of public hybrid rice, of the 133 farmers who have planted hybrid rice, 105 (79%) have not tried public hybrids while 21% have tried public hybrids. This data implied that the project still needs to intensify the promotion of the public hybrids and ensure the timely availability of the F1 seeds. Among the reasons given for not trying public hybrids are because of their limited knowledge on public hybrids (91); the unavailability of F1 seeds of the public hybrids in seed growers/agri supply/local DA offices (80); and the perceived higher yields of hybrid rice varieties developed by private seed companies (60).

Through the PHRSS, the Bureau of Plant Industry (BPI) procured FS of M1 and M20 for distribution to public hybrid seed growers in the country. Total seeds delivered to BPI were: 9,258kg S line, 1,500kg A line, 3,000kg P line, and 500kg R line. Through this scheme, the project generated fund to continue its seed production activities.

PROJECT 5

Rice Seed Systems in Northern Mindanao

AP Tape, SDD Taglucop, and SMB Acosta

The project aimed to improve the availability, accessibility, and utilization of high-quality seeds in Northeastern Mindanao. Studies implemented under this project were the collection of rice data from the major rice producing provinces in the region and analysis of the supply and demand of HQS per province. Based on the data collected, nine out of 12 provinces have limited access to supply of HQS. Even with the excess supply of HQS in Region XI, it is still not enough to cover the deficits in Regions X and Caraga. Areas with limited access to HQS supplies were identified and will be the focus of promotion and enhancement of HQS utilization.

Consultations and coordination were conducted in 12 Provincial Agriculture Offices to identify problems in the supply, demand, and utilization of HQS in every province. Partnerships with the PLGUs were also established, which facilitated access to data and information in the province.

Secondary rice data from the 10 major rice producing provinces in Northeastern Mindanao were collected. Data included the lists of seed producers, rice area planted and harvested, seed production areas of the seed growers, and sex disaggregated data. Based on the supply and demand analysis, Northeastern Mindanao needed 623,386 bags of HQS; however, supply is not enough to support this demand.

A master list of 235 accredited seed growers or ASGs (169 male and 66 female) was produced to be used for the survey in the first quarter of 2020. The survey will be conducted to identify active and inactive seed growers, reasons on stopping seed production activities, seed production management practices, and identify gender issues.

In PhilRice Agusan, a varietal demo of newly released varieties was also established and showcased to more than 600 farmers during the Lakbay Palay conducted on October 18, 2019. This activity enabled farmers in the area to see the performance of the newly-released inbred varieties and in using high-quality seeds.

PROJECT 6

Rice Seed Systems in Bicol and Eastern Visayas

RT Dollentas, JRF Mirandilla, AMD Manato, and GCC Enot

The use of high-quality rice seeds (HQS) can contribute to increased grain yield by 5- 20%. However, 50% of the total harvested rice areas in the country is only planted to HQS. In Bicol, provinces such as Catanduanes and Masbate have only 30% utilization rate for tagged seeds (DA-RFO5, 2018 data), and only 31% in Eastern Visayas Region or EVR (DA-RFO8, 2018 data). Among the major factors contributing to the low utilization of HQS are low awareness on the advantages of using HQS and problems on availability and access to HQS.

Hence, the project aimed to increase the utilization rate for HQS of inbred varieties by enhancing its availability and accessibility in Eastern Visayas (Region 8) and Bicol (Region 5) for increased competitiveness of the Bisakol (Bisaya and Bikolano) rice farmers. Specifically, it hoped to identify effective strategies and interventions that can improve the production and availability of HQS through benchmarking of the current seed production systems of the 298 Bisakol ASGs (232 male and 66 female). Also, it will identify the involvement of women in rice seed production and possibly identify interventions to enhance their participation in the rice seed industry. In addition, it aims to develop a planting map schedule, which can aid the seed growers in ensuring timely availability of HQS to the farmers in the areas. Lastly, it will establish Binhing Palay farms to serve as immediate sources of HQS of small farmers, demonstrate the advantages of using HQS, showcase the performance of the newly-released varieties, and identify adaptable varieties in the locality.

In 2019, profiling and characterization of the 91 (67%) ASGs in Bicol was completed. Five major issues in inbred rice seed production system in the region were identified: (1) unoptimized utilization of accredited seed production areas due to farm tenurial status issue; (2) aging and poor technical capacity of the ASGs; (3) lack of postharvest facilities; (4) delays in the seed certification process; and (5) low seed production outputs due to less number of quantities submitted for seed certification over their production. Based from these results, it is recommended that the ASG must have a leased agreement with the farm-owner for at least three years. There is also a need to develop/accredit new breed of ASGs and to improve the conduct of trainings for seed grower's accreditation with emphasis on PalayCheck, diagnostic and ICT-based tools for rice production. In addition, on-farm technology demonstration activities and trainings to capacitate ASGs must be continuously conducted, and the need to organize these ASGs into a farmers' group or cooperative to avail the mechanization and other programs of the DA/Government. Further, the existing government support to the ASGs should be enhanced to include procurement of their produce through the National Rice Program. Lastly, there is a need for a strict implementation of the Seed Act and/or the seed certification guidelines, and must be revised for its improvement.

In Bicol, women are viewed as feeble farm workers with 14 (22%) of the female ASG respondents mainly involved in farm supervision, record-keeping, and in marketing of seeds. Generally, men workers are still preferred over the female farm workers because they are perceived to be more capable of doing hard labor. However, women are also significant during transplanting as they plant better (the seedlings are erect and planted at 2-3 seedlings/hill) and follow the straight-row planting pattern. Women are preferred, but maybe because sometimes they are the only available labor force in the community for transplanting, weeding, and harvesting. Women are also preferred during rouging because they are more meticulous compared to men. Hence, women farm workers can be organized as service providers for transplanting and rouging, especially in areas where farm labors are scarce or depleting. Pertinent primary and secondary data are currently being collected and processed to develop planting calendar maps which will be recommended to the seed growers to serve as their guides in planting ahead to ensure timely availability of high-quality inbred seeds to the farmers.

The project has also partnered with six ASGs in Bicol to establish the Binhing Palay farms using foundation and registered seeds. For the 2019 DS, the top five nationally recommended varieties were showcased, tagging NSIC Rc 222 as the best performing and preferred variety in Camarines Sur, Camarines Norte, and Sorsogon, while NSIC Rc 238 and Rc 300 in Albay. Seeds produced from these farms served as the immediate source of HQS in the provinces. For 2019 WS, new varieties such as NSIC Rc 352, Rc 402, Rc 438, Rc 480 (Green Super Rice) were showcased in Sorsogon and Catanduanes. Likewise, new Salinas rice varieties such as NSIC Rc 182, Rc 290, Rc 392, Rc 464, which are salt-tolerant varieties, were demonstrated in Catanduanes.

Data gathered on seed production system in Bicol Region are in process to provide concrete evidence to the findings and identify solutions to achieve higher impacts. However, initial outputs of the project are already significant in understanding the rice seed systems in the regions, while the identified gaps and bottlenecks in the existing systems will be addressed through the recommended interventions to improve the availability and accessibility of HQS in Bicol. Likewise, the project helped in promoting the adoption of HQS of new and adapted rice varieties, which can eventually help achieved a competitive rice industry.

PROJECT 7

Rice Seed Systems in Northeastern Luzon

AL dela Cruz, LC Javier, OC Malonzo, JD Batcagan, HR Pasicolan, and AJB Acierto

The Rice Seed Systems project in PhilRice Isabela aimed to enhance the existing rice seed distribution system in Northeastern Luzon by improving the seed production, promotion, and utilization, as well as the seed distribution network. This 2019, the project focused on gathering important baseline data and information to be used in determining specific interventions to improve the rice seed system in the region. Hence, component 1 of the project focused on the existing rice seed production protocols/practices to produce higher classes of seeds, while component 2 determined the existing rice seed distribution system and conducted SWOT analysis in Cagayan Valley and CAR. Component 3 on the other hand concentrated on gathering information on the current promotional strategies for high quality seed (HQS) utilization. Component 4 aimed to conduct rice seed production training programs for various sectors in the rice seed value chain.

To serve the seed requirements of the seed growers in Region II and CAR, the station produced an average of 5.5t/ha clean seeds from its BS to FS and FS to RS Inbred Seed Production in 2019 WS. Though some varieties lodged days before harvesting due to strong winds, all the samples provided for the NSQCS laboratory analysis passed the necessary tests. Excess volume will serve as buffer seeds. There is a need to increase the yield of seed production areas in the station through the determination of the optimum fertilizer rate recommendation. Practices on land preparation should also be improved (following Key Check 2) to minimize mixtures from seeds of other varieties and impurities like weed seeds.

SWOT Analysis on the existing rice seed distribution system in Cagayan Valley and CAR was conducted to improve the rice seed distribution through the formal seed system, and to develop the informal seed system for adverse rice environments (saline-prone, drought-prone, upland and heirloom). Results showed that Cagayan Valley has a very good rice seed distribution system due in part to favorable factors in the seed production phase. Rice seeds produced in the region is at surplus level, making the seeds readily available for the farmers. In contrast, CAR has challenges when it comes to availability and accessibility of rice seeds due to the topographical condition of the region as well as some cultural factors. However, major rice producing provinces like Kalinga and Apayao and some parts of Ifugao, specifically Alfonso Lista and Lamut, have a good seed production and distribution system. Farmers have good access to certified rice seeds owing to the presence of accredited seed growers and established cooperatives that supply sufficient volume of rice seeds. However, other provinces in the region like Benguet and Mountain Province are dependent on the imported rice seeds from other provinces through government assistance and seed outlets. Hence, Benguet and Mountain Province can be our future sites to implement some of the interventions like establishment of adaptability trials and conduct of trainings to develop seed growers in the areas.

Assessment on the HQS-use in CAR and Cagayan Valley was also conducted. Results of the survey corroborated the information gathered in the SWOT analysis regarding rice seed distribution system in Cagayan Valley. Proof of this was the high utilization of certified seeds and hybrids in the region for both cropping seasons. However, it was found that rice seed growers were producing seeds primarily on the basis of biggest demand and only for irrigated and rainfed areas. Varieties needed by farmers in the adverse ecosystems (saline, upland, and those planting traditional varieties) were neglected. As a result, farmers in these areas plant available varieties like those for irrigated. Demonstration cum seed production of rice varieties through the informal system can be established to produce the seeds, which can be made available and accessible to the farmers in the adverse areas.

In the upland areas, saved seeds (from previous cropping) are common materials used and some other farmers also used certified seeds like NSIC Rc 222. The Seed Exchange program (SEEDEX) of the DA already started the seed distribution system in the upland areas. This will be strengthened by the project in partnership with the DA RFOs.

In CAR, the use of certified seeds (CS) is already high for wet and dry seasons. However, some farmers are still using good seeds (from previous CS seed material) and saved seeds. Meanwhile, farmers in rainfed areas also use the same varieties like in the irrigated areas because rainfed varieties are not available.

Moreover, municipalities with low HQS utilization were identified in Region II as target sites for the establishment of on-farm technology demonstrations. These are: (1) Tuao in Cagayan (38% HQS utilization); (2) Dupax del Norte in Nueva Vizcaya (15%); (3) Maddela (24%) and Aglipay (19%) in Quirino Province; and (4) Ramon (33%) and Angadanan (50%) in Isabela.

Newly-released varieties (NSIC Rc 438, NSIC Rc 440, and NSIC Rc 442) were also tested for adaptability in Cabatuan, Isabela in 2019 WS. Based on the field performance, NSIC Rc 440 obtained the highest yield (8.4t/ha), followed by Rc 442 (6.9t/ha) and Rc 438 (6.4t/ha). These are potential varieties for farmers' utilization owing to their good performance. At the farmers' level, NSIC Rc 222 (farmers' most preferred variety) has an average yield of 6.5t/ha, still comparable to the yields of the newly-released varieties tested.

Rice Seed Systems in CALABARZON and MIMAROPA

MAT Talavera, JLO Canilao, R Pedron, JM Montesines, AD Calimlim, and A Bueza

To cascade the RSSP initiatives in region IV-A and IV-B, PhilRice Los Baños implemented various interventions to help improve the rice seed systems in the regions. The initiatives conducted include forging partnership with various rice stakeholders through consultative meetings, developing key strategy to optimize varietal adoption by identifying preferred rice varieties of farmers, and testing various communication platform to improve the accessibility of registered seeds by the accredited seed growers.

A rice seed consultative workshop with different stakeholders in Region IV-A was conducted to identify common problems encountered by the seed growers and discussed possible solutions to these problems. Data will be used in developing key strategies to better facilitate the production, timing of deployment of tagged seeds and the promotion and adoption of HQS in the two regions.

A seed reservation and information dissemination scheme using the social media and mobile/text messaging was developed and pilot tested to improve the information flow and dissemination on seed availability in the station. Using these new reservation schemes, 25% of the registered seed growers (RSGs) in the PhilRice BDD master list reserved their seeds requirements in advance through text messaging. Seed availability information dissemination was facilitated using the FB group created for the RSGs. The station will continue to improve and utilize these schemes.

The station also established varietal demonstration of six recommended inbred rice varieties in both regions and identified farmer's preferred rice varieties using the participatory varietal selection (PVS) approach. Participants in the PVS included rice researchers from UPLB and PhilRice, and farmers and LGU staff from the municipalities of Los Baños, Bay, Calauan, Pila, and Sta Cruz in Laguna. Results showed differences in the considerations of plant characteristics during selection by farmers and researchers. Hence, the two groups identified preferred and least preferred varieties. To achieve the goal, female and male farmers selected the same plant characteristics resulting in the identification of the same most-preferred and least-preferred varieties in 2019 WS. These varieties selected will be produced and promoted for farmer's adaption. A similar undertaking will also be conducted in other municipalities of Laguna and in MIMAROPA in the coming seasons.

PROJECT 9

Rice Seed Systems in Southwestern Mindanao

PLP Sabes, OH Abdulkadil, IV Boholano, DAN Sumlay, MAM Macadildig, and MC Romarez

The RSS project in Southwestern Mindanao was implemented to promote the performance and adoption of the newly-released varieties and to develop a comprehensive and efficient seed system to ensure that HQS of these varieties are available and accessible at the right time to men and women rice farmers in the regions.

Seventeen newly-released varieties were showcased in Regions 9, 12, and BARMM;16 were inbred varieties and one public hybrid (NSIC Rc 204H or M20). In 2019 WS, NSIC Rc 222, Rc 218, and Rc 400 outperformed the rest across sites with a yield level of 6.6t/ha, 6.4t/ha, and 6.3t/ha, respectively. Seeds of these varieties will be produced and promoted to the farmers for wider adoption. With the generation and establishment of database of accredited seed growers (ASGs) in the area, it is now easy to program the seed production requirements of the regions including deployment of needed seeds. The benchmarking survey conducted revealed that >2ha rice fields were allocated by ASGs to produce HQS of different varieties during the dry season while <2ha during the wet season. Average yield across seasons ranged from 3.57t/ha to 5.18t/ha. Based from these data, there is still room to improve the yields of the ASGs; hence, capacity enhancement will be continuously conducted in partnership with DA-ATI to improve their technical knowledge and skills.

Moreover, the 22 ASGs in North Cotabato were geotagged to provide exact location to local farmers to source their seeds. The geotagging will provide information where the project can best intervene to address the availability and accessibility of HQS in those areas with limited or no ASGs. The project will continue to develop strategies to improve the Rice Seed Systems in the regions to help ASGs and farmers increase their productivity and improve their competitiveness, which eventually will contribute to the over-all rice productivity in the country.

PROJECT 10

Rice Seed Systems in Visayas

MO Palanog, HA Pajarilo, GE Bello, KV Canto, CLC Mondejar, LG Dogeno, MO Etchon, MA Norbe, RF Austria, CJE Parina, and CU Seville

The Rice Seed Systems project in Visayas covers Regions VI and VII with three components, namely: (1) Increase utilization of high-quality seeds to improve the rice seed system in Central and Western Visayas; (2) Improving seed quality through research-based interventions; and (3) Promotion of high-quality seeds of location-specific high yielding rice varieties in Visayas.

The project established 1.1ha technology demonstration cum seed production participated by four farmer cooperators. The demo had a yield increase of 1t/ha; lower than in the previous season's yield of 3t/ha. The HQS produced from the techno-demo served as seed source for the farmers in the area. Aside from showcasing the performance of the varieties and producing HQS, the demo also served as the "learning field" of the participants of the modified farmers field school (MFFS) on PalayCheck System and quality seed production training participated by 20 DAR beneficiaries having only 0.22 - 0.4ha farmland. The MFFS site is adjacent to the station. Aside from the seed production practices, technologies such as the Leaf Color Chart and Minus-One Element Technique were introduced to the farmers to better manage fertilizers, increase yields, and reduce input costs. At the end of the season-long training and before harvest, a Field Walk was organized to showcase the techno-demo to the other local small farmers.

A benchmarking activity was conducted in 2019 DS and WS to address challenges in seed production, processing, and storage (in 2016-2018 data). Results showed that there is the same percentage of abnormal seeds (half-filled, unfilled, discolored, and damaged), which is 18% of the stored seeds and the newly-harvested seeds. Seeds produced in 2019 DS contained discolored seeds (59%) with NSIC Rc 428 having the highest number of discolored seeds at 42. It was observed that the moisture content of the seeds stored in the warehouse increased at 0.42% per month (R2=0.92). Hence, most of the seeds stored in the warehouse had >14% MC after six months of storage. This can be attributed to the high monthly relative humidity (RH) recorded in the warehouse from July to November 2018 ranging from 72 to 80%, which is very high from the ideal RH of 70% and below and temperature of 27-34^{o}C.

Lastly, irrigated and rainfed varieties were also demonstrated and evaluated at Murcia, Negros Occidental to identify varieties for recommendation in the Visayas. In the 2019 WS trial for irrigated lowland, NSIC Rc 222 outyielded other entries with 4.95t/ha followed by the newly-released varieties NSIC Rc 400 and Rc 442 with yields of 3.81t/ha and 3.35t/ha, respectively. In the trial for rainfed, all the varieties tested and evaluated obtained high yields and farmers identified their preferred variety. The varieties with the highest acceptance rate based on the participatory variety selection were NSIC Rc 472 (100%) and Rc 478 (76%). Yield performance of the different varieties were 5.13t/ha (NSIC Rc 216), 6.23t/ha (Rc 426), 6.36t/ha (Rc 472) and 5.66t/ha (Rc478).

Abbreviations and acronyms

AYT - Advanced Yield Trial
ABE - Agricultural and Biosystems Engineering
AEW - Agricultural Extension Worker
ATI – Agriculture Training Institute
AESA - Agro-ecosystem Analysis
AC - Amylose Content
BLB - Bacterial Leaf Blight
BLS -Bacterial Leaf Streak
BCA - Biological Control Agent
BS - Breeder Seeds
BPH -Brown Planthopper
BPI - Bureau of Plant Industry
CGMS - Cytoplasmic Genic Male Sterility
COF - Commercial Organic Fertilizer
CDA - Cooperative Development Authority
DAS - Days After Sowing
DAT - Days After Transplanting
DF - Days to Flowering
DM- Days to Maturity
DAR - Department of Agrarian Reform
DA-RFOs - Department of Agriculture-Regional Field Offices
DoF - Department of Finance
DOLE - Department of Labor and Employment
DTI - Department of Trade and Industry
DSR - Direct-seeded Rice
DS - Dry Season
FBS – Farmers' Business School
FC - Farmers' Cooperative
FSM - Farming Systems Models
FAA - Fish Amino Acid
FGD - Focused Group Discussion
FSP - Foundation Seed Production
FRK - Farm Record Keeping
GABA - Gamma-aminobutyric Acid
GT - Gelatinization Temperature
GAD - Gender and Development
GYT - General Yield Trial
GCA - Genetic Combining Ability
GIS - Geographic information system
GEMS - Germplasm Management System
GAS - Golden apple snail
GL - Grain length
GQ - Grain quality
GW - Grain Weight
GY - Grain Yield
GLH - Green Leafhopper
GOT - Grow Out Test
HR - Head Rice
HRA - Heat Recovery Attachment
HIPS – Highly-intensified Production System
HQS - High-quality Rice Seeds
HON - Hybrid Observational Nursery
HPYT - Hybrid Preliminary Yield Trial
ICT - Information and Communication Technology
IEC - Information Education Communication
IBNM - Inorganic-based Nutrient Management
ICM - Integrated Crop Management
IPM - Integrated Pest Management
JICA - Japan International Cooperation Agency
IRRI - International Rice Research Institute
IA - Irrigators' Association
KP - Knowledge Product
KSL - Knowledge Sharing and Learning
LCC - Leaf Color Chart
LFT - Local Farmer Technicians
LGU - Local Government Units
LPS - Low Pressure Steam-operated
SB - Stemborer
LE-CYPRO - Lowland ecotype Cyperus rotundus
MFE - Male Fertile Environment
MSE - Male Sterile Environment
MAS - Marker-assisted Selection
MRL - Maximum Root Length
MR - Milled Rice
MER - Minimum Enclosing Rectangle
MOET - Minus-one Element Technique
MC - Moisture Content

MAT - Multi-Adaptation Trials
MCRTP - Multi-crop Reduced Till Planter
MET - Multi-environment Trial
MYT - Multi-location Yield Trial
NAAP - National Azolla Action Program
NCT - National Cooperative Test
NFA - National Food Authority
NRAM - National Rice Awareness Month
NSIC - National Seed Industry Council
NSQCS - National Seed Quality Control Services
N - Nitrogen
NBSP - Nucleus and Breeder Seed Production Project
NFGP - Number of Filled Grains Panicle
ON - Observation Nursery
OSIS - One Stop Information Shop
OBNM - Organic-based Nutrient Management
PL - Panicle Length
PW - Panicle Weight
PVS - Participatory Varietal Selection
PWD - Person with Disabilities
PhilMech - Philippine Center for Postharvest Development and Mechanization
PRISM - Philippine Rice Information System
PhilRice - Philippine Rice Research Institute
PSA - Philippine Statistics Authority
PTC - PhilRice Text Center
P - Phosphorus
PVS - Plant Variety Selection
K - Potassium
QTL - Quantitative Trait Loci
RCBD - Randomized Complete Block Design
RSP - Registered Seed Production
RBB - Rice Black Bug
RCEF - Rice Competitiveness Enhancement Fund
RCEP - Rice Competitiveness Enhancement Program
RCM - Rice Crop Manager
RHGEPS - Rice Hull Gasifier Engine Pump System
RPH - Rice Planthopper
RSTC - Rice Specialists' Training Course
RTV - Rice Tungro Virus
RBFHS - Rice-based Farming Household Survey
KQ - Kernel Quality
SV - Seedling Vigor
ShB - Sheath Blight
ShR - Sheath Rot
SMS - Short Messaging Service
SNP - Single Nucleotide Polymorphism
SWRIP- Small Water Reservoir Irrigation Project
SRB - Stabilized Rice Bran
SUCs - State Universities and Colleges
SB - Stem Borer
TESDA - Technical Education and Skills Development Authority
TDF - Technology Demonstration Farm
TRV - Traditional Rice Varieties
TOT - Training of Trainers
TPR - Transplanted Rice
URBFS - Upland Rice-Based Farming
WS - Wet Season
WCV - Wide Compatibility Variety
YSB - Yellow Stemborer

Editorial team

Managing Editors
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Julianne A. Suarez

Layout Artist
Anna Marie F. Bautista

Editorial Assistants
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Glendaline L. Kalaw
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Laarnie L. Mandia

Language Editors
Charisma Love B. Gado-Gonzales
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Corporate Services Division

Editorial Advisers
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Eduardo Jimmy P. Quilang
Ronan G. Zagado

We are a government corporate entity (Classification E) under the Department of Agriculture. We were created through Executive Order 1061 on 5 November 1985 (as amended) to help develop high-yielding and cost-reducing technologies so farmers can produce enough rice for all Filipinos.

With a "Rice-Secure Philippines" vision, we want the Filipino rice farmers and the Philippine rice industry to be competitive through research for development in our central and seven branch stations, coordinating with a network that comprises 59 agencies strategically located nationwide.

We have the following certifications: ISO 9001:2008 (Quality Management), ISO 14001:2004 (Environmental Management), and OHSAS 18001:2007 (Occupational Health and Safety Assessment Series).

PHILRICE CENTRAL EXPERIMENT STATION Maligaya, Science City of Muñoz, 3119 Nueva Ecija
Tel: (44) 456 -0277 • Direct line/Telefax: (44) 456-0354

BRANCH STATIONS:

PhilRice Batac, MMSU Campus, Batac City, 2906 Ilocos Norte
Telefax: (77) 772-0654; 670-1867; Tel: 677-1508 Email: batac.station@philrice.gov ph
PhilRice Isabela, Malasin, San Mateo, 3318 Isabela
Mobile: 0908-875-7955; 0927-437-7769; Email: isabela.station@philrice.gov.ph
PhilRice Los Baños, UPLB Campus, College, 4030 Laguna
Tel: (49) 536-8620; 501-1917; Mobile: 0920-911-1420; Email: losbanos.station@philrice.gov.ph
PhilRice Bicol, Batang Ligao City, 4504 Albay
Tel: (52) 284-4860; Mobile: 0918-946-7439; Email: bicol.station@philrice.gov.ph
PhilRice Negros, Cansilayan, Murcia, 6129 Negros Occidental
Mobile: 0949-194-2307; 0927-462-4026; Email: negros.station@philrice. gov.ph
PhilRice Agusan, Basilisa, RTRomualdez, 8611 Agusan del Norte
Telefax: (85) 343-0768; Tel: 343-0534; 343-0778; Email: agusan.station@philrice.gov.ph
PhilRice Midsayap, Bual Norte, Midsayap, 9410 North Cotabato
Telefax: (64) 229-8178; 229-7241 to 43 Email: midsayap.station@philrice.gov.ph

SATELLITE STATIONS:

Mindoro Satellite Station, Alacaak, Sta. Cruz, 5105 Occidental Mindoro
Mobile: 0917-714-9366; 0948-655-7778
Samar Satellite Station, UEP Campus, Catarman, 6400 Northern Samar
Mobile: 0948-754-5994; 0929-188-5438
Zamboanga Satellite Station, WMSU Campus, San Ramon, 7000 Zamboanga City
Mobile: 0910-645-9323; 0975-526-0306

PhilRice Field Office, CMU Campus, Maramag, 8714 Bukidnon
Mobile: 0916-367-6086; 0909-822-9813
Liaison Office, 3rd Flor. ATI Bldg, Elliptical Road, Diliman, Quezon City
Tel/Fax: (02) 920-5129