2020

PhilRice R&D Highlights

PhilRice Midsayap

Contents

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EXECUTIVE SUMMARY

The DA-PhilRice Midsayap Experiment Station (PhilRice MES) continues to implement relevant research and development (R&D) projects to achieve PhilRice's mission of a rice-secure Philippines. The station is mandated to develop and promote location-specific rice and rice-based technologies as a continuum undertaking embedded in the R&D projects implemented in Southwestern Mindanao. The challenges brought by the pandemic made it inevitable to sacrifice and adjust some deliverables to fit into the "new normal" condition. However, the concentrated effort of each staff made the station withstand and continue its committed service to all stakeholders within and even outside its Area of Responsibility (AOR).

For 2020, PhilRice MES had undertaken 34 R&D projects/studies/components, 14 of which were funded by DA-BAR, while 24 were station, division, and program-based. The station was propelled to align its activities to PhilRice's outcomes. Specifically, it deals with the following R&D major final outputs (MFOs): technologies, extension support, education and training services, R&D services, and technical publications and intellectual property. The R&D projects/studies/components focused on: a) field reaction and yield performance of promising lines for inbred and hybrid; b) integrated pest management options and decision tools, c) farming machines and tools for the rainfed environment; d) trainings and knowledge sharing and learning (KSL) activities; e) on-farm technology promotion through technology demonstration; f) presence of PhilRice in the R&D communities through IEC materials and communication support.

For this year, the effects of yield-related traits on rice grain yield of hybrid varieties in Type 4 climate were validated for its performance. The summarized agronomic traits and yield components data of 13 hybrid rice varieties in four locations [1) PhilRice-Midsayap, Bual Norte, Midsayap Cotabato; 2) Brgy. Bambad, Isulan, Sultan Kudarat; 3) Brgy. Baguer, Pigcawayan, Cotabato; and 4) Brgy. Dajay, Surallah, Cotabato] were subjected for stability analysis. The correlation and path analyses showed parallel implications. The total number of grains, spikelet fertility, panicle/m^2, and one thousand grain weight directly affect grain yield in hybrid rice.

The continued monitoring of insect pests through light trapping for long-term data showed the highest population of rice black bug (RBB) in October with 3,480 bugs/catch, and the white stemborer (WSB) peak population was observed in August with five adults/catch. Regular monitoring should be done to know the pest population dynamics and apply appropriate management strategies.

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Two biocon agents, *Metarhizium anisopliae* and *Paecilomyces* sp. were identified from the field-collected RBBs at 51% and 49%, respectively. A higher percentage (37.16%) of RBB fungal infection was recorded during the first semester than in the second semester, which only had 4.65%. Collected infected RBBs were individually placed in a tube or vial and stored in the fridge for future isolation and mass production.

Information on rice, such as where and when it is grown, how much is produced, and what affects the crop as it grows, through integrating remote-sensing and information and communications technology is necessary for decision-making and policy support towards achieving a rice-secure Philippines. The Philippine Rice Information System (PRISM) addressed the need to revolutionize how data and information on rice are collected and used. PRISM delivers reliable, location-specific, and seasonal information on the extent of rice cultivated areas, yield estimates, and rice areas affected in the event of flood or drought. The end-season estimate of area planted to rice for the 1st semester of 2020 in Region IX was 73,061, Region XII has 137,997.60 hectares, while BARMM has 51,287.12 ha. For the 2nd semester, based on the satellite images from March 16 to October 1, 2020, the end-season estimate on the area planted with rice was 82,307 ha for Region IX, 157,214 ha for Region XII, and 61,507 ha for BARMM.

For the 1st semester, two methods were used during the rice and non-rice validation (RNR), such as Stratified and Purposive in Region IX and XII. Due to the pandemic, a stratified RNR will be done every three years since it is more laborious and time-consuming. For the 2nd semester of 2020, only the purposive method was applied in the RNR activity of the three regions. Data on yield estimates during the 2020 1st semester showed that the majority of the rice yield in BARMM and Region XII per municipality ranges from 3.0t/ha to 4.0t/ha. However, Region IX has the highest rice yield, with 21 municipalities in Zamboanga del Sur harvesting more than 4t/ha. In the 2nd semester, 35% obtained a rice yield of more than 4.0t/ha from farmers in Zamboanga del Sur and some parts of Zamboanga Sibugay, North Cotabato, and South Cotabato. In terms of production volume, the estimated total palay output for the 2020 first semester showed that SOCCSKSARGEN has the highest production among the three regions, while North Cotabato has the highest production at the provincial level during the two-cropping season. Furthermore, PRISM performed flood damage assessment in areas affected by low pressures. PRISM also conducted a quick survey on the prevailing prices of fresh and dry palay sold from October to November across 16 regions in the Philippines. Region IX's average fresh palay price ranges from Php12.62 to Php14.06, while the dry palay price was at Php19 based on NFA price. Farmers of Region IX usually do not sell dried palay). In Region XII, the average fresh palay price ranges from Php10.95 to Php13.23, while dry palay price ranges from Php12.54 to Php14.64. Farmers in BARMM usually sell fresh palay to the local traders/millers from Php10.67 to Php12.80, while they sell dry palay from Php12.83 to Php16.14.

There were 230 germplasms evaluated for rice tungro virus (RTV) reaction under the modified screening method. Data showed that only six entries [EURIAN (515), DAYOYO (4336), MILAGROSA (4633), PARAY BATUKAN (4742), BUKID (5305),

LUBANG (11300)] showed intermediate reaction while the rest of the entries were rated resistant. However, it must be noted that RTV inoculum was low in the field, resulting in low RTV infection.

For the white stemborer damage, seventy -three traditional rice varieties (TRVs) were evaluated using TN1 as susceptible check and TKM6 for resistant check during Dec 2019 to March 2020 or 2019 Wet Season (WS) and July to Oct 2020 or 2020 Dry Season (DS) planting. For WS 2019 entries, none of the 73 entries were rated susceptible for deadheart damage. However, during the reproductive phase, where a high population of white stemborer was recorded, 13 of the entries were rated susceptible, including the three advance entries [SB 89 (RED 18), SB 115 (C4 DINORADO), and 2SB-3 (DINORADO)] which rated resistant in the previous trial. This is a fact when the pest population level is increased; even resistant cultivars may produce a susceptible response. BINERNAL RED was recorded as highly susceptible, with 32.67% whitehead damage. For DS 2020, 71 entries were found resistant, and four entries were found moderately resistant against deadheart damage at 35 DAT. Data on whiteheads showed 15 entries were highly resistant, 18 entries were resistant, 24 entries were moderately resistant, 9 entries were moderately susceptible, and 9 entries were susceptible.

The Multi-Environment Testing (MET) for Irrigated Lowland Rice Stage 1 and 2 aims to identify lines with high yield performance with optimum tolerance to pests and diseases and adaptability to diverse environmental conditions. In MET 1 Module 1, 12 entries had a yield of 5t/ha, which was comparable to IRRI 123 (check variety). Three entries had a yield of 5t/ha, which surpassed the yield of all check varieties in MET 1 Module 2. For MET 2 Module 2, six entries yielded 5t/ha to 6t/ha, which outyielded the check varieties. On the other hand, in MET 2 Module 2, 19 entries yielded 4t/ha to 5t/ha, which surpassed the yield of check varieties. In terms of insect pest damage, in MET 1 Module 1, 43 entries showed resistance to white stemborer (WSB) damage at vegetative phase (deadhearts), while at reproductive phase, all entries were resistant to WSB damage.

The MET hybrid elite lines results showed that the majority of the test entries were early to medium maturing (97 to 114 days). The number of tillers ranged from 22 to 30 per hill at the vegetative phase, and the number of productive tillers ranged from 10 to 15 per hill at the maturity phase. The yields of the different hybrid entries were recorded from 2.69t/ha to 6.80t/ha and did not outyield the check inbred rice, NSIC Rc22.

The National Cooperative Testing (NCT) studies in the station screened different NCT entries for major diseases and insect pests. NCT entries for 2019 WS (216 entries), 2020 DS (119 entries), and 2020 WS (190 entries) were established this year. The screening methods followed the NCT manual. An induced method was done for bacterial leaf blight (BLB) and sheath blight (ShB) at field conditions and for rice blast (RB) at blast nursery under screenhouse conditions. For rice tungro virus (RTV) screening, a modified induced method was done, and insect pest screening relied on the natural infestation of WSB and RBB. Disease and insect pest evaluation for each setup was done following the protocol set by the NCT

manual and SES for rice. For 2019 WS, results identified the resistant entries for BLB (69 entries), ShB (108 entries), RTV (52 entries), RB (171 entries). For 2020 DS, the number of resistant entries was lower with BLB (24 entries), ShB (26 entries), RTV (44 entries), and RB (71 entries) compared with the 2020 WS, with 55 entries resistant to BLB, 152 entries for ShB, 164 entries for RTV, and 135 entries for RB.

For NCT insect pest screening, 85 entries were evaluated against white stemborer damage at the vegetative and reproductive phases in 2020 DS. Out of the entries evaluated, 77 entries were resistant to deadhearts, and 45 entries showed resistance to whiteheads, comparable to TKM6. All entries showed resistance to RBB damage. For 2020 WS, 183 were evaluated against deadhearts and whiteheads. A total of 177 entries showed resistance to deadhearts, while 71 entries were resistant to whiteheads.

For NCT-hybrid, 26 entries were evaluated for field performance during 2020 DS. Entries were found resistant to intermediate reactions against pests and diseases. Yield-related traits such as phenotypic acceptability and others were found acceptable and resistant. Grain yield entry #2 obtained a yield of 6.2t/ha, higher than local check NSIC Rc 222 that obtained a yield of 6.1t/ha but lower than Mestiso 20 that obtained 6.6t/ha; while other entries ranged from 1t/ha to 5t/ha.

The NCT-submergence aims to evaluate the performance of 18 NCT-sub entries for induced submergence stress. For the survival percentage at 7 days, entries #6 (PR41566-SubMSal270-1-1-1-1-1-3), #10 (PR41561-B-10-Sal1-1-1-3-AuDin 1-2), #11 (PR45816-B-B-Drt1-1-3-1-2), and #15 (PR42867-34-Sub 1-2-1-1-2) surpassed the tolerant check entries 1 (NSIC Rc 194) and 2 (PSB Rc 68) with the survival rate of 15%. At 14 days after de-submergence, eight entries obtained a survival rate ranging from 40% to 50% higher than the tolerant check that has a survival rate of 35% and plant vigor of 7.

Field evaluation (validation/confirmation) was conducted on the identified traditional varieties (TRVS) and other germplasm having tolerance/resistance against stemborers. For 2019 WS entries, none of the 73 entries were rated susceptible for deadheart damage. However, during the reproductive phase where a high population of white stemborer was recorded, 13 of the entries were rated susceptible, including the three advance entries [SB 89 (RED 18), SB 115 (C4 DINORADO), and 2SB-3 (DINORADO)] which rated resistant during the previous DS trial. This shows that when the pest population level is increased, even resistant cultivars may produce a susceptible response. BINERNAL RED was recorded as highly susceptible, with 32.67% whitehead damage. For 2020 DS entries, data on whiteheads showed that 15 entries were highly resistant, 18 entries were resistant, 24 entries were moderately resistant, 9 entries were moderately susceptible, and 9 entries were susceptible.

The study on the field screening of entries against rice black bugs (RBB) aims to evaluate the reaction of different rice lines to it. For 2020 DS, 177 entries were screened in the field in three batches. The first batch of entries was planted in August, and the second batch was planted in September. All entries showed a

resistant reaction against RBB for both batches. One factor that caused the low infestation of RBB was the synchronous planting of the adjacent fields. However, for the third setup planted in October, the results showed otherwise. Overall, two entries showed resistant reaction against deadheart, 40 entries were moderately resistant, 80 entries were moderately susceptible, and 9 entries were susceptible due to the harvesting activities of the adjacent fields.

The Water-efficient and Risk Mitigation Technologies for Enhancing Rice Production in Irrigated and Rainfed Environments (WateRice) project aimed to increase production efficiency and water-productivity and reduce production risks through dissemination and adoption of appropriate crop management technologies in irrigated and rainfed environments with six interrelated work packages. A total of nine adaptive research trials were established in M'lang, Cotabato for DS and WS 2020. Location-specific package of technology developed consisted of the following: Variety – NSIC Rc 222 (or other recommended varieties); Weed management – Pretilachlor and Fenoxaprop-ethyl+ethoxysulfuron; Nutrient management - using RCM; and use of plastic drum seeder for crop establishment. In DS 2020, BMP+Plastic Drum Seeder (PDS) obtained yields ranging from 4.42t/ha to 7.73t/ha with an average of 5.69t/ha. In contrast, the Farmer's practice (FP) resulted in yield ranging from 3.64t/ha to 5.52t/ha with an average of 4.75t/ha. The yield advantage of BMP from FP based on actual yield was 20% (0.94t/ha). In WS 2020, BMP+PDS obtained yield ranging from 4.16t/ha to 8.43t/ha with an average of 6.23t/ha; FP yield ranged from 3.64t/ha to 7.10t/ha with an average of 5.84t/ha. Thus, the advantage based on the actual yield of BMP compared to FP was 6.68% (0.39t/ha) higher.

The project "Improving crop productivity in drought-prone rainfed lowlands in the Philippines with mechanized direct-seeding technology" aims to raise the productivity of rice-based farming in rainfed environments with reduced production costs. This is through the adaptation of the multi-purpose compact seeder (i.e., hand tractor-mounted seeder) to local conditions and introducing the customized machine as a tool to improve crop management practices. The Multi-Purpose Seeder (MPS) was tested on major crops like rice, corn, and mungbean in the different regions. In Mindanao, Region 12 was selected as the testing site, particularly the provinces of Sultan Kudarat and South Cotabato.

The package of technologies (POT) for drip-irrigated aerobic rice is expected to develop a system of pumping and distributing water for irrigation in the uplands to ensure that water is available for use in upland rice production at any time it is needed. Barangay Renibon, Pigcawayan, Cotabato was identified as the project site, where the mini dam was constructed along the creek near the barangay. Reservoir-1 was constructed to accumulate 9 ft^3 (dimensions of 3 ft x 2 ft x 1.5 ft) free-flowing water from the mini dam (water source). Reservoir-2 was constructed to accumulate 9 ft^3 (dimension of 3 ft x 2 ft x 1.5 ft) free-flowing water from reservoir-1 through gravitational pull. Manual excavation of 8 m x 5 m x 1.5 m (60 m^3) pond alongside installed ram pump was also made to serve as a drainage pond for the excess water from the ram pump.

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PhilRice Midsayap maintained its Branch Development Initiative (BDI) through the project "Accelerating Adoption of Sustainable Rice-Based Technologies." It was geared towards increasing rice farmers' productivity utilizing various development approaches and extension service modalities to enhance the competitiveness of the rice industry stakeholders. Specifically, it aimed to facilitate technology adoption of cost-saving and high-yielding rice production technologies in the target areas through area-based technology promotion. The project was carried out through four interrelated components that specifically offer rice solutions for the current farming scenario within the station's AOR.

The first component was assessing local rice farming practices in PhilRice Midsayap AOR, specifically on the adoption of rice production practices under the PalayCheck System. This served as the basis for conceptualizing a localized technology package and promoting best farming practices to address yield gaps. The second component, RISE (Relevant Innovations through Strategic Empowerment) for Quality Rice, aimed to enhance the understanding and increase the knowledge of men and women farmers, local executives, students, professionals, and other stakeholders from regions IX, XII, and BARMM on rice and rice-based farming technologies through trainings, farmers' field day, and knowledge sharing and learning (KSL) activities. The third component was the station's Palayamanan Plus which showcased a practical, cost-saving, and yield-enhancing farming system to maximize the utilization of resources, reduce farming risks, and enhance the sustainability, productivity, and profitability of the farmers. The fourth component was the REACH (Rice Education through Advocacies and Communication Hosts) for Quality Rice which aimed to harmonize communication strategies and communication-related activities of PhilRice Midsayap through the production of radio plugs, production and distribution of IEC materials, the conduct of technology exhibits, and advocacy campaigns for more effective dissemination and promotion of rice and rice farming technologies.

In 2020, the project provided vital information for the development workers in packaging location-specific technology and giving need-based rice solutions. Four key management areas that could increase yield to 5t/ha or more in BARMM were identified, which include seed selection, land preparation, crop establishment, and nutrient management based on the PalayCheck system for irrigated lowland rice. Planting modern varieties such as PSB Rc 18, NSIC Rc 158, Rc 160, Rc 222, Rc 224, Rc 226, and NSIC Rc 238; and hybrid rice varieties such as TH 82, Bigante, and Mestizo 20 was also shown to be important. Nutrient management was also found an essential input in attaining optimum yield through split application in the rice field.

The project also trained 58 rice industry stakeholders (27 male and 31 female) through the conduct of a two-day appreciation course with emphasis on PalayCheck System and Palayamanan Plus with an average knowledge gain of 45.17%. Twenty-five (21 male and 4 female) local chief executives of Isulan, Sultan Kudarat, particularly the Committee Chairpersons on Agriculture, were trained on PalayCheck System and Palayamanan Plus with an average knowledge gain of 50.18%. These trainings helped the participants learn new rice farming

technologies that eventually resulted in the allocation of funds for their respective municipal agricultural initiatives. In addition, a total of 33 upland rice farmers (6 male and 27 female) from Barangay Renibon, Pigcawayan, Cotabato benefited from the two-day appreciation training course on Upland PalayCheck System and Palayamanan Plus, with an average knowledge gain of 40.16%.

The Palayamanan Plus of the project established a rice-based farming model, which included vegetable, mushroom production, and vermicomposting. The cost of producing an average yield of 6,590kg of fresh palay per hectare was Php57,341.20 or Php8.70 per kilo. A total gross income of Php128,505 was attained with the current price of Php19.50 per kilo. Thus it generated a net profit of Php71,163.8. Based on the output of the Palayamanan Plus in the station, farmers are highly encouraged to practice crop diversification, intensification, and integration that promote sustainable farming and livelihood. This will strengthen resiliency in an increasingly changing environment for rice-based farming through site visits, farm visits, seminars, and trainings.

The project was also able to reach farmers and other rice stakeholders through free technology tips and advisory through one-minute radio plugs that were aired via local radio networks in Regions 9 and 12, focusing on the PalayCheck System. A total of 6 radio plugs were aired, such as the use of quality seeds, fallow period, land preparation, synchronous planting, PhilRice Midsayap services, and promotion of the PhilRice Text Center (0917- 111-7423). A total of 2,528 IEC materials such as leaflet on rice bug management, palay drying management, how to use leaf color chart (LCC), the poster of harmful and beneficial insects, kinds of weeds, “tamang pag-ani,” and PhilRice Magazine were provided and distributed to rice stakeholders within the AOR as their ready reference and guide in their farming activities. To make rice information and technology accessible and reach more rice stakeholders, one official social media account was maintained with 17 quote cards posted, with a total of 223,103 reach, 1,510 post engagements, and 2,012 page likes and follows.

Aside from the set project targets, DA’s Plant Plant Plant Program was also supported through the provision of vegetable seeds and seedlings. A total of 24,477 assorted vegetable seedlings and 1,602 seed packs (pechay, tomato, okra, upo, tomato, eggplant, patola, and ampalaya) and seed packs were distributed to 11 barangays of Midsayap and 2 barangays of Libungan, Cotabato. These are Bual Norte, Bual Sur, Palongoguen, Bagumba, Malingao, Agriculture, Central Glad, Lower Glad, Salunayan, Poblacion 2, Lagumbingan, Baguer and Gumaga. A total of 1,139 households (531 male and 608 female) received the vegetable seedlings and seed packs.

Aside from the BDI, the station likewise looked into improving the current rice production system and made high-quality rice seeds available and accessible among men and women rice farmers at the right time within South Western Mindanao. The Rice Seed System study was implemented through the conduct of the two components: evaluation of the rice seed production and distribution pathway and demonstration and evaluation of newly released varieties adopted

within the station's AOR. The project generated information for the seed production operation, delivery, and distribution system of the station and other identified seed growers for the improvement of the rice seed system mechanism within Southwestern Mindanao. It also generated a map on the rice cropping calendar within Southwestern Mindanao that could help better position high-quality seeds in the target areas. In addition, it enhanced the technology adoption among men and women rice farmers in the target areas through the adaptation of newly-released and recommended varieties in Mindanao by establishing technology demonstrations.

The RiceBIS project of Midsayap is composed of four components:

Component 1 of the project aimed to capacitate 49 men and 26 women farmers in rice and rice-based agro-enterprise and develop a marketing plan by linking farmers to markets and financing institutions in the local rice value chain and local organizations. A capacity-building process was made to effect changes and let farmers actively participate in the value chain and capture part of the value addition. For 2020, a total of 63.3ha production area from seven (7) organized clusters of Barangay Bual Sur, Central Glad, Upper Glad I, and San Pedro, Midsayap received support on agro-enterprise mind-setting and organizational building activities. It was carried out through continuing partnership with identified lined agencies of the government. One (1) Pre-registration webinar was conducted through the Cooperative Development Authority – Region XII (CDA-XII) participated by 49 farmers (21 male and 28 female). Further meetings started in October 2020 after the 2020 wet season harvest with 75 farmers (49 male, 26 female) from Bual Sur, Central Glad, Upper Glad I, and San Pedro, Midsayap. These activities were preparatory for the agro-enterprise engagement, including product identification for each cluster and supply assessment.

Component 2 seeks to enhance farmers' knowledge of rice production, processing, and agripreneurship by establishing 11 techno-demo farms participated by 4 female and 7 male farmers from Central Glad and San Pedro, Midsayap. It has served as an actual showcase for the adoption of drum seeder in crop establishment by RiceBIS- and non-RiceBIS-participating farmers in the community. As part of the initiatives in upscaling the production of rice seeds in the community as potential agro-enterprise, 11 male farmers were trained on the basic course on inbred rice seed production and certification. These farmers showed interest in becoming seed growers in their community. The RiceBIS Team also distributed free inbred certified seeds and fertilizers from RCEF, OPAg-Cotabato, and DA-RFO XII. A total of 75 farmers (49 male and 26 female) received the said inputs for WS 2020 and DS 2021. Assessment of harvesting practices that contribute to postharvest losses in Midsayap was also conducted.

Component 3 assessed the harvesting practices that contribute to postharvest losses. The postharvest losses were gathered in the RiceBIS communities with a target reduction of 2% from the national average of 16.47% to 14%. The data on postharvest losses were taken from mechanical harvesting using a combine-

harvester. Data were gathered from two farmer members (1 male and 1 female) using NSIC Rc 226. The average postharvest loss in terms of yield was 144.17kg/ha, equating to 1.98%. In contrast, using a combine-harvester recorded a baseline loss of 3.65% in WS 2018, which was lowered to 1.98% in WS 2020.

The Component 4 of the project regularly monitor and evaluate farmers in the RiceBIS communities to attain a yield increase of at least 1t/ha, reduce cost up to Php8/kg, and increase in household income by 50%. Data were taken every after harvest from 72 farmer respondents (46 males, 26 females) of Central Glad, Bual Sur, Upper Glad I, and San Pedro, Midsayap. Gathered results were compared to the baseline data so the RiceBIS project management team can develop strategic recommendations to address the challenges in the RiceBIS community (e.g., high cost of labor and farm inputs). Yield for DS 2020 in the RiceBIS community at Midsayap increased from the baseline of 4.40t/ha to 5.28t/ha. The cost per unit of fresh palay was reduced from Php12.47 to Php9.24. This large reduction in the production cost of fresh palay and the yield increment resulted in a 29.13% increase in the net income of farmers, from Php18,618.00 to Php24,042.10. There is a positive trend in the production performances of RiceBIS farmers in Midsayap, Cotabato based on the M&E of 2020DS.

As a Gender and Development (GAD)-tagged project of PhilRice Midsayap, RiceBIS farmers' issues like high cost of labor and farm inputs were analyzed so the RiceBIS project team can suggest and initiate appropriate interventions. The introduction of drum seeder in crop establishment helped reduce the cost of labor and palay seeds. From the usual seeding rate of 120 to 180 kg/ha, at least 50% (60 kg/ha) reduction was recorded when the drum seeder is used in crop establishment. The RiceBIS project team helped the farmers in lobbying for free farm inputs and services from different agencies. All RiceBIS farmers received free seeds and fertilizers from the OPAg-Cotabato and DA-RFO XII.

Gender issues and women's rights have been explained to all RiceBIS men and women farmers during meetings. The project also introduced other activities that promote the sustainability of gender equality. For instance, when RiceBIS participants were asked about their thoughts regarding women in farming, 91% of female participants asserted that while their male partners work on the farm, they listened to them since they attend the FFS, meetings, and seminars. They follow their suggestions based on what they have learned from the RiceBIS classes. Only 9% of the female participants (they called themselves "Amazona") attended all RiceBIS activities and also worked full-time on the farm. They further affirmed that "whatever men can do in the rice field, they can also do as women farmers," even land preparation and manual harvesting. These women are widows, so they believe they must do the hard work because they do not have anybody to rely on. Conversely, 94% of the male participants said they do not let their wives work on the farm because they are busy with other household chores like rearing the kids and joining the fad of planting ornamentals to sell or just for aesthetic value. Their wives' main involvement will only be during harvest when their products are sold since their wives are the "treasurer/budget officer" in the household. However,

the remaining 6% of the male participants said that their wives are important in all farm activities, including meetings, because they are involved in the decision-making.

Issues and concerns were tackled during regular RiceBIS project team meetings. Problems that cannot be solved at the project team level or branch station's level were brought to the higher management. The project team is composed of female (2) and male (2) staff who actively participated in all the branch initiatives on GAD, such as trainings and seminars.

The key driving force behind rising agricultural productivity and promoting agricultural development, especially for sustaining higher rice productivity, is a proper seed system analysis of production operation, certification, delivery, and distribution. Thus, this project was conducted to improve the current rice production system and make high-quality rice seeds available and accessible among men and women rice farmers at the right time within South Western Mindanao. This was implemented through the conduct of the two components: evaluation of the rice seed production and distribution pathway and demonstration and evaluation of newly-released varieties adopted in Southwestern Mindanao. The project generated information for the seed production operation, delivery, and distribution system of PhilRice Midsayap and other identified seed growers for the improvement of the rice seed system mechanism within Southwestern Mindanao. It also generated a map on the rice cropping calendar within Southwestern Mindanao that provided information on the proper positioning of high-quality seeds in the target areas. In addition, it enhanced the technology adoption among men and women rice farmers in the target areas through the adaptation of newly-released varieties showcased through technology demonstrations.

The Public Hybrid Rice Commercialization Project (PHRCP) in PhilRice-Midsayap aimed to make public hybrids regularly available to interested rice farmers, create more jobs in communities where hybrid rice seed production areas are located, and strengthen the competitiveness of rice production through increased yield, better quality rice, and decreased production cost. The project conducted major activities such as parental seed production and technology demonstration of hybrid rice seed production. Results showed a stable yield of S line production for Mestiso 20 in Lake Sebu, South Cotabato, with an average yield of 1.8t/ha. The cost-benefit analysis shows a high return of 0.75 that implied a highly feasible enterprise to venture into.

For this year, the Cotabato Special Rice: A Participatory Approach in Building a Community Rice-Based Enterprise Project aimed to strengthen the cooperation among coop members of the Cotabato Dinorado Agriculture Cooperative (CODACO) in Banisilan, Cotabato. Regular monitoring and updating by PhilRice staff were done to know the status of their cooperative and to ensure the purity of their Dinorado rice or seed. For Alamada, from the eight (8) clusters in the municipality, the processing of requirements is ongoing for one (1) potential cooperative to be called Dado Upland Chrislam Agriculture Cooperative or DUCACO. Although there are travel restrictions due to the COVID-19 pandemic, the project team managed to

conduct and facilitate a series of activities in collaboration with partner agencies. Since the CSR project is only until this year, the project team is only waiting for the final editing and printing of the Production Techno-guide on Dinorado Rice and the Implementers' Manual on Dinorado Rice Production.

The ongoing RiceBIS Phase II project is implemented in the municipality of Libungan, North Cotabato, which consists of four components:

Component 1 aims to empower organized group of farmers (e.g., associations, cooperatives). In the Philippines, cooperatives are by far the most effective means by which farmers can run an enterprise. They are institutionally supported with no tax taken from any of their business ventures. Besides, public and private organizations (e.g., financial institutions) prefer to work with them or any organized group of farmers in extending services. Not all cooperatives, however, function effectively. This study examined this problem and offered solutions in enhancing their capability as an organization. Furthermore, it aimed to build social capital among the two identified farmer organizations in Libungan, Cotabato and individual farmers by building strong relationships with a collective vision for the community. Partnership with Gumaga Farmer Association (Gumaga FA) and Baguer Farmer Association (Baguer FS) were done to build on existing local resources and skills, structures, and systems with a total of 102 farmers (40 male and 62 female). Out of the two farmer organizations, four commodity and production clusters were formed. These clusters have undergone regular meetings with the facilitators for capacity enhancement and agro-enterprise engagement preparatory activities.

Component 2 is geared toward capacity enhancement activities. In the middle of the COVID-19 pandemic, a total of 102 farmers (40 men and 62 women) from Barangay Baguer and Gumaga, Libungan underwent a technical capacity enhancement through a season-long Farmers' Field School (FFS) for 2020 WS. The FFS was carried through weekly meetings in four batches (Tuesday to Friday) to maintain a lesser number of participants per meeting and to comply with the minimum health standards set by the Inter-Agency Task Force (IATF), especially the social or physical distancing between participants who are not from the same household. The updated Palaycheck System was introduced to these farmers. During the first two months of FFS, the meetings started at 8:00 in the morning. However, farmers' attendance declined due to their preoccupation with other tasks in the house or other transactions from 8:00 AM onwards. After consultation, the RiceBIS Team and farmers agreed to start the FFS activity at 5:00 in the morning, especially during agro-ecosystem analysis (AESA). This adjustment improved the FFS attendance. Facilitators and participants also had a chance of having an actual farm visit to the farmer(s) with problematic rice fields for an actual diagnosis and collaborative decision-making.

Other activities included the following: a) Five techno demo farms (3 in Gumaga and 2 in Baguer) were established to serve as learning sites of the farmers; b) briefing of farmers on insurance services by the Philippine Crop Insurance Corporation-Region XII (PCIC-XII); c) a two-day farm walk and open forum, divided into two

groups to minimize overcrowding of farmers; d) supplemental seminar on banana production and management was conducted to upgrade the knowledge of 70 farmers (38 females and 32 male) on banana production, disease identification, and proper management through our partners in OPAg-Cotabato and OMAg-Libungan; e) an online Pre-registration seminar with the Cooperative Development Authority-Region XII (CDA-XII) attended by 29 farmers (12 male and 17 female); and f) a five-day basic course on inbred seed production and certification attended by six female farmers who wished to be accredited as seed growers in their community. These capacity enhancement activities aimed to upgrade and enrich both male and female farmers' knowledge on rice production and other related topics.

Component 3 is focused on teaching farmers to engage in business on the assumption that they are already equipped with knowledge on entrepreneurship through capacity enhancement activities. It aims to help farmers view farming as a "business." Through product selection and supply plan assessment coaching and mentoring sessions, 40 male and 62 female farmers were guided to selected markets to generate additional income. In the case of Gumaga and Baguer farmers with four (4) clusters, after undergoing capacity enhancement activities for 2020 WS cropping season, they underwent mind-setting activities from October 2020 up to the present. Also, each cluster is currently undergoing a twice-a-week meeting for product selection and supply assessment. These activities were strengthened through a strong collaboration with other partner agencies and by forming a site working group (SWG) to guide, monitor, and provide support to farmers on the market engagements of Libungan RiceBIS communities.

For the monitoring and evaluation (M&E), this component examined whether project investments are translated into outputs and eventually impacts. It aimed to monitor and evaluate the farmers in the RiceBIS communities and to serve as a support system in carrying out activities from the beginning up to the establishment of rice-based enterprises. The socio-economic indicators based on M&E shall serve as a reference for the management and implementers in making sound decisions. It will also help in determining the effectiveness of the interventions provided to the farmers and to determine whether the program targets are achieved or not. Baseline data gathering was done for 102 farmer respondents. Results showed 61% of the farmers are female, 51 years old on average, with 25 years of farming experience, and most are high school graduates. They have an average of 1.15 ha for irrigated lowland rice farming with a 4.52t/ha production yield. To produce a kilogram of fresh palay, they have to invest Php12.45/kg and earn a net income of Php23,114.00/ha per cropping season. On the use of high-quality seeds, 51% used farmers' seeds, 39% used certified seeds, 8% used good seeds, and 1% used hybrid and foundation seeds. Farmers identified the rice black bug and stem borer infestations and the high labor cost as the top production constraints. The top marketing problems identified were the low price of fresh palay and high delivery cost. Postharvest losses for 2020 WS recorded an average of 1.51% yield loss using a combine-harvester.

EXECUTIVE SUMMARY

The Republic Act 11203-An Act Liberalizing the Importation, Exportation, and Trading of Rice Lifting for the Purpose the Quantitative Import Restriction on Rice, and for Other Purposes was signed by President Rodrigo Roa Duterte on February 14, 2019. Section 13 of the law created the Rice Competitiveness Enhancement Fund. Specifically, Section 13.b established the seed component, which states that 30% of the Rice Fund shall be released to and implemented by the PhilRice and shall be used for the development, propagation, and promotion of inbred rice seeds to rice farmers and the organization of rice farmers into seed growers' associations and/or cooperatives engaged in seed production and trade.

PhilRice, in consultation with relevant agencies, LGUs, DA-RFOs, private sector, and farmers' groups, developed the Implementing Guidelines (Rule 13.17 of the IRR) for rice seed development, propagation, and promotion consistent with the Philippine Rice Industry Roadmap within 60 days. This includes but is not limited to: (a) eligibility criteria for prospective recipients; (b) modality of selection; and (c) mode of implementation. The program steering committee reviewed for the approval of the DA Secretary.

The program's goal was to help improve the competitiveness and income of rice farmers through an increase in yield and productivity and to increase the adoption of certified inbred rice seeds and their corresponding integrated crop management. Specifically, it aims to increase the utilization of certified inbred rice seeds in areas with high potential for increasing competitiveness; to improve quality, availability of, and access to certified inbred rice seeds.

For the 2020 implementation, farmer-beneficiaries received a total of 2 bags per hectare at 20kg/bag. However, only a maximum of 6 bags per farmer registered to the Registry System for Basic Sectors in Agriculture (RSBSA) can be given for free in the 57 target provinces.

For 2020 WS (March 15 to September 16, 2020) seed delivery and distribution, RCEF PhilRice Midsayap Unit achieved 102.11% of its targets, with 283,245 bags distributed to 117 cities/municipalities with an estimated area of 138,692.5 ha within 8 provinces across regions 9, 12 and BARMM. For 2021 DS (September 16, 2020- March 15, 2021) seed delivery and distribution, 52.35% has been achieved with a total of 89,315 bags distributed out of the targeted 170,600 bags for 75 cities/municipalities. However, the seed delivery and distribution will continue until the end of the cropping season in March 2021.

In 2020 WS, a total of 12 sites of technology demonstration or "Palay Sikatan" were established across region 9 (4 sites) and 12 (8 sites). In Region 9, an average production of 6.22t/ha was recorded. NSIC Rc 222 got the highest yield of 7.8t/ha and 7.4t/ha both in Alicia, Zamboanga Sibugay, and Molave, Zamboanga del Sur, respectively. While in Region 12, an average production of 5.61t/ha was recorded. Moreover, in South Cotabato, NSIC Rc 440 had the highest yield of 7.48t/ha and

8.6t/ha in Sultan Kudarat. In North Cotabato, NSIC Rc 222 obtained a yield of 5.6t/ha, while in Sarangani, NSIC Rc 158 got 6.8t/ha. Moreover, the average production cost of palay per kilogram was Php7.14 in Region 9, while it was Php5.42 in Region 12.

With the passing of the RA 11203 (Rice Tariffication Law), the training for RCEF farmers was conceptualized to implement development programs aiming to help rice farmers increase their productivity and income. Amidst the COVID 19 pandemic, a revised methodology was employed to enhance farmers' knowledge and practices by improving their yield and income. Although web-based and online learning are fast becoming the "new normal," ordinary farmers may have limitations on usage and access. Thus, FFS season-long training was conducted and complemented with other learning methods. Results showed that most of the farmer-participants increased their average numbers of key checks achieved, which helped them increase their average yield by 1.6t/ha after the 2020 WS cropping season. Results also showed that there was an average increase of 48% in knowledge gain. In addition, farmer-participants also improved the competitiveness of their farm operation and production management through their introduction to economic analysis in rice production. Therefore, farmer participants should be able to have a rice production technology with Php8 to Php9 cost of production per kilogram so that they can earn as much as Php5 to Php6 per kilo given a farm gate price for fresh palay at Php13 to Php14 per kilo.

PROJECT 1

Accelerating Adoption of Sustainable Rice-Based Technologies

Ommal H. Abdulkadil

The project *Accelerating Adoption of Sustainable Rice-Based Technologies* is geared toward increasing rice farmers' productivity utilizing various development approaches and extension service modalities to enhance the competitiveness of the rice industry stakeholders. Specifically, branch initiatives aimed to facilitate the acceleration of technology adoption of cost-saving and high-yielding rice production technologies in the target areas through area-based technology promotion. Understanding the rice farming practices and determining the yield gaps is a fundamental step in developing location-specific technologies to provide appropriate technological solutions to create positive change and impact in the farming communities we serve. Thus, the project was carried out with four interrelated project components to offer rice solutions to the current farming scenario within the station's AOR.

The third project component is the Station's Palayamanan Plus, which showcases a farming system that is practical and cost-saving, and features yield-enhancing management practices that maximize resource utilization, reduce farming risks, and enhance sustainability, productivity, and profitability. The fourth project component is the REACH (Rice Education through Advocacies and Communication Hosts) for Quality Rice, aimed to harmonize communication strategies and communication-related activities of PhilRice Midsayap through radio plugs, production and distribution of IEC materials, technology exhibits, and advocacy campaigns in disseminating and promoting rice production technologies.

To reach more farmers, particularly those in far-flung areas, and to accelerate technology dissemination and adoption, a harmonized communication strategy was implemented to disseminate and promote rice production technologies in the target areas and intended beneficiaries. Technology tips were given to the intended clients through the radio program. One-minute radio plugs were aired through local radio networks in regions 9 and 12 focused on the PalayCheck System (KeyChecks 1-8).

For 2020, the project accomplished and provided vital information for the development workers to be used in packaging location-specific technology and giving need-based rice solutions. Four key management areas based on the PalayCheck system for irrigated lowland areas that could contribute to the goal of achieving a 5t/ha yield or more were identified. This includes seed selection, land

preparation, crop establishment, and nutrient management. Planting modern varieties such as PSB Rc 18, NSIC Rc 158, Rc 160, Rc 222, Rc 224, Rc 226, and NSIC Rc 238; and hybrid rice varieties such as TH 82, Bigante, and Mestizo 20 were also included. Nutrient management was also found an essential input in attaining optimum yield through split application in the rice field.

Moreover, a total of 58 rice industry stakeholders (27 male and 31 female) were trained through the conduct of a two-day appreciation course with emphasis on PalayCheck System and Palayamanan Plus with an average knowledge gain of 45.17%. Twenty-five (21 male and 4 female) Isulan local chief executives, particularly the Committee Chairpersons on Agriculture, were trained on PalayCheck System and Palayamanan Plus with an average knowledge gain of 50.18%. They benefited and learned new rice farming technologies that eventually encouraged them to allocate funds for their respective municipal agricultural initiatives.

In addition, 33 upland rice farmers (6 male and 27 female) from Barangay Renibon, Pigcawayan, Cotabato benefited from the two-day appreciation training course on Upland PalayCheck System and Palayamanan Plus. They had an average knowledge gain of 40.16%.

The Palayamanan Plus Project was established to provide opportunities to increase the farmers' income and improve productivity. It is composed of different components, including rice, vegetable, mushroom production, and vermicomposting. To produce 6,590 kg of fresh palay per hectare, the total production cost was Php57,341.20 or Php8.70 per kilo. A total gross income of Php128,505 was attained with the current price of Php19.50 per kilo; thus, generating a net profit of Php71,163.8. Based on the output of the Palayamanan Plus in the station, farmers are highly encouraged to practice crop diversification, intensification, and integration that promote sustainable farming and livelihood. This will strengthen resiliency in an increasingly changing environment for rice-based farming through site visits, farm visits, seminars, and trainings conducted.

Moreover, communication strategies were implemented to reach more farmers within the AOR. Free technology tips and advisory through one-minute radio plugs were aired via local radio networks in Regions 9 and 12, focused on PalayCheck System. A total of six one-minute radio plugs were aired, such as the use of quality seeds, fallow period, land preparation, synchronous planting, PhilRice Midsayap services, and promotion of PhilRice Text Center. Also, a total of 2,528 IEC materials such as leaflets on rice bug management, palay drying management, guides on the leaf color chart (LCC), posters of harmful and beneficial insects, kinds of weeds, "tamang pag-ani" and PhilRice Magazine were provided and distributed to rice stakeholders within the AOR for reference and guide in their farming activities. To make rice information and technology accessible and reach more rice stakeholders, one official social media account was maintained with 17 quote cards posted, 223,103 reach, 1,510 post engagements, 90% response rate, and 2,012 page likes and follows.

Finally, in line with the DA-Plant Plant Plant Program, a total of 24,477 and 1,602 assorted vegetable seedlings (pechay, tomato, okra, upo, tomato eggplant, patola, and ampalaya) and seed packs distributed, respectively, to 11 barangays of Midsayap and 2 barangay of Libungan, Cotabato. These are Bual Norte, Bual Sur, Palongoguen, Bagumba, Malingao, Agriculture, Central Glad, Lower Glad, Salunayan, Poblacion 2, Lagumbingan, Baguer and Gumaga. A total of 1,139 households (531 male and 608 female) received the vegetable seedlings and seed packs.

Assessment of Local Rice Farming Practices in Area of Responsibility of PhilRice-Midsayap

Isagane V. Boholano, Sylvia Therese C. Quiring, Mohamadsaid B. Gandawali, Datu Ali M. Sumlay, Ommal H. Abdulkadil

The evaluation of adopted localized rice production technologies, especially for the irrigated rice ecosystem, is essential to understand the farmers' needs and problems that are limiting their crop yield. A multi-stage sampling procedure was employed with 269 rice farmers randomly selected within BARMM. Data were analyzed using descriptive statistics such as frequencies and percentages. Results revealed that rice farmers in BARMM were still in their productive years with a mean age of 52.80; they have six household members and have at least one member working on the farm. The respondents are comprised of 118 male and 31 female farmers. The farmer respondents are mostly involved in at least one farmer's organization. They have an average farm experience of 19 years. Almost all of them have a non-formal education, with a high percentage of them having finished only elementary and high school. The best practices identified that could yield more than 5t/ha were rice varieties and seed class used by the participants, crop establishment, and nutrient management.

Based on Palaycheck evaluation, key checks with a low adoption rate that ranges from 35-60% were Key Check 1 (Seed Selection), Key Check 2 (Land Preparation), Key Check 4 (Crop Establishment), Key check 5 (Nutrient Management) and Key Check 6 (Water Management). The high adoption rates (80-85%) were for Key Check 3 (Synchronous planting), Key Check 7 (Pest management) and, Key Check 8 (harvest management). In addition, rice farmers in BARMM believe that they could get a higher yield through efficient water and nutrient management, good cultural management, and proper timing of planting (should coincide with good weather conditions to minimize pest and disease damages).

RISE for Quality Rice (Relevant Innovations through Strategic Empowerment for Quality Rice)

Ommal H. Abdulkadil, Datu Ali N. Sumlay

A two-day appreciation course with emphasis on PalayCheck System and Palayamanan Plus trained 58 rice industry stakeholders (27 male and 31 female) with an average knowledge gain of 45.17%. Meanwhile, 25 (21 male and 4 female) Isulan local chief executives, particularly the Committee Chairpersons on Agriculture, were trained on PalayCheck System and Palayamanan Plus with an average knowledge gain of 50.18%.

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In line with DA's Plant Plant Plant Program, a total of 24,477 assorted vegetable seedlings (pechay, tomato, okra, upo, tomato eggplant, patola, and ampalaya) and 1,602 seed packs were distributed to 11 barangays of Midsayap and 2 barangays of Libungan, Cotabato. A total of 1,139 households (531 male and 608 female) received the vegetable seedlings and seed packs.

Palayamanan Plus in PhilRice-Midsayap

Isagane V. Boholano, Ommal H. Abdulkadil, Datu Ali N. Sumlay

The Palayamanan Plus model farm has been established in PhilRice-Midsayap to showcase and employ a system that is practical, cost-saving, and yield-enhancing. Management practices focused were those geared to maximize the utilization of resources, reduce farming risks, and enhance the sustainability, productivity, and profitability in all identified components. This study successfully showed how all components are linked to each other (biomass from rice seed production was used in mushroom as a substrate for growing spawn and as bedding for vermicompost production; compost was used as fertilizer in the vegetable enterprise). The rice production component of Palayamanan Plus still economically viable if and when the cost of production is at PhP8 to 1. It was also found out that the opportunity to have additional income from those identified vegetables along with other components in the Palayamanan Plus model farm must be suitable and applied with appropriate technologies. In addition, the component supported the Ahon

Lahat Pagkain Sapat (ALPAS) Program of the Department of Agriculture (DA) during the onset of the COVID-19 pandemic. It distributed vegetable seedlings and seed packs to 1,139 households in 13 identified barangays of Midsayap, Cotabato. Overall, this component can motivate farmers to practice crop diversification, intensification, and integration that promote sustainable farming and livelihood.

REACH FOR QUALITY RICE (Rice Education and Communication Hosts for Quality Rice)

Sylvia Therese C. Quiring, Mohamadsaid B. Gandawali, Isagane V. Boholano, Datu Ali N. Sumlay

The fourth component of the Branch Development Initiative was aimed to disseminate and promote rice production technologies through radio plugs, production and distribution of IEC materials, the conduct of exhibits, KSL, and Lakbay Palay. As mass gatherings were discouraged, the methodology of the component was slightly altered to still be able to produce the expected outputs regardless of the lockdowns and mobility issues. In lieu of exhibits, knowledge sharing and learning activities, and Lakbay Palay sessions, more focus was given to producing and disseminating knowledge products.

Five radio plugs were aired in the station's coverage area, and one newsletter was drafted and prepared for publication. Alongside these conventional communication channels, the station's official social media account was maintained and improved, resulting in 204,951 reach, 1,510 post engagements, and 2,012 page likes and followers. The intensification of information dissemination through social media during the community quarantine period also boosted the station's page response rate to 90%. This implies that social media is a very useful platform to reach rice stakeholders.