2020

PhilRice R&D Highlights

PhilRice Batac

Contents

STATION

PhilRice Batac

Branch Director: Reynaldo C. Castro

EXECUTIVE SUMMARY

PhilRice Batac was established in 1999 as the Dryland Agriculture Research Center of PhilRice with its R&D activities focused on development of technologies and provision of technical services to drought-prone and saline areas typical of Northwest Luzon. The Station's R4D agenda is captured in the Rice-based Agriculture for Semi-arid and Adverse Places Program v2 (Rice ASAPv.2).

Rice ASAPv.2 emphasizes the urgency of developing appropriate technologies to neutralize the continuous threat of climate change exacerbated by the impacts of international trade policies. It also captures the advances in science, especially in information technology, as tools for improving further the technologies and in enhancing the provision of support services to our clients. It also promotes inclusive growth, reaching out to the most marginalized sectors of the Philippine rice industry.

For 2020, the station implemented 20 research and development projects and studies, 10 of which were funded by Department of Agriculture-Bureau of Agricultural Research (DA-BAR); DA-Regional Field Office (RFO) I; International Rice Research Institute (IRRI); and Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD); and Department of Social Welfare and Development (DSWD). The other 10 were division and program-based. The station R&D projects and studies included (a) breeding of varieties with low glycemic index (GI) and micronutrient-dense, and salt-tolerant traits; (b) integrated crop management for dry-direct seeded and saline areas and pre- and postharvest management of aromatic and organic rices; (c) development of water harvesting and soil water conservation technologies; (d) development of advisories, specifically on weather-based planting calendars for rainfed ecosystem and PRISM; and (e) development and evaluation of two-row manually operated transplanter and multi-purpose (MP) seeder. Station-developed technologies reached farmers, local farmer technicians (LFTs), Agricultural Extension Workers (AEWs), and other stakeholders through training programs conducted under the Rice Business Innovations Systems (RiceBIS) program, the Rice Specialist Training Course, Training of Trainers (TOT), and Farmer Field School (FSS). Seed requirements of farmers and seed growers in Ilocos Region were also met through the Rice Competitiveness Enhancement Fund (RCEF), Rice Seed System (RSS), and the station's Business Development Unit (BDU).

PROJECT 1

Dryland Rice-Based Integration and Practices for Farm Diversification (DRIP for Farm Diversification)

Annielyn Y. Alibuyog

A project in collaboration with the Food and Agriculture Organization (FAO), it aimed to reduce weather-related risks through crop diversification, mixed cropping and choice of crops. Since 2018, only the study on dry direct seeded rice (DDSR) was implemented under the project due to budget constraints.

Pot and on-farm field experiments were conducted using the coarse, medium, and fine soil textures. Among the weed management treatments, Treatment 2 (manual weeding, 4 times) had the highest yield (1483 kg/ha), followed by Treatment 3 (application of pre-emergence + post-emergence + 2 manual weeding) with 1198 kg/ha. This study also complemented the DA-BAR-funded project on the use of multi-purpose (MP) seeder.

Improvement of Integrated Crop Management (ICM) for Dry-Direct Seeded Rice in Rainfed Ecosystem

Annielyn Y. Alibuyog, Alfhie James G. Galanza, and Melvin S. Andres

Pot and field experiments were conducted during the 2020 WS in Batac City and Paoay, Ilocos Norte under rainfed condition. Effective and economical weed treatments for DDSR in rainfed areas were tested: (T1) no weed control, (T2) manual weeding, (T3) pre-emergence herbicide + post-emergence herbicide + manual weeding + manual weeding, (T4) pre-emergence herbicide + post-emergence herbicide + post-emergence herbicide + manual weeding, (T5) pre-emergence herbicide + post-emergence herbicide + combination of pre- and post-emergence herbicide + post-emergence herbicide + manual weeding, (T6) pre-emergence herbicide + combination of pre- and post-emergence herbicide + manual weeding + manual weeding. T2 (manual weeding, 4 times) recorded the highest yield (1,483kg/ha), followed by T3 (pre- + post-emergence + 2 manual weeding) with 1,198kg/ha. The higher yield of T2 was attributed to its more filled grains (3,440 grains/lm) and denser seeds (21.3g). It also had the tallest plants (71.4cm) indicating reduced stress due to weeds. For the Relative Yield Loss (RYL) over the control (T2), Treatment 3 had the lowest RYL (19.2%).

PROJECT 2

ADAPT for Sustainability (Amelioration of Dry and Adverse Places through Technologies for Sustainability)

Reynaldo C. Castro

The project enhanced the sustainability of drought-prone and other adverse farming environments against the increasingly grave threats and challenges of climate change. Implementers validated PhilRice-developed in-field water harvesting systems for small farms; improved the productivity of rainfed farms; developed and packaged good agricultural practices for rainfed and upland rice-based farms; and determined the effect of water management on grain quality, phytochemical content, and antioxidant activity of aromatic and non-aromatic rice. It was composed of three studies: (1) adoptability of the PhilRice water harvesting and soil and water conservation system and integration with good agricultural practices; (2) pre-harvest and postharvest management of aromatic and organic rices; and (3) development of manually-operated transplanter.

Two water harvesting and soil and water conservation systems are being developed. These included collecting canals set along the contour and plastic drums for storage in the upland areas; and collecting canal, underground storage, solar-powered pump, and low-cost drip irrigation system for water distribution on rainfed lowland areas.

Project researchers found that (1) alternate wetting and drying (AWD) is indeed a cost-saving technology; (2) inorganic fertilizer increased the yield of *Burdagol*-Laguna Type and PSB Rc 82 but not in *Gal-ong* indicating that the traditional variety can be organically-grown; and (3) organic fertilizer or chicken manure increased the yield of three varieties under the study.

An improved prototype of the two-row manually-operated transplanter developed by Taguda et al. (2017) was fabricated. Initial testing showed that the number of seedlings per hill and number of missing hills were reduced.

Adoptability of the PhilRice Water Harvesting and Soil and Water Conservation System and Integration with Good Agricultural Practices for Rice Intensification and Crop Diversification in Rainfed and Upland Areas

Reynaldo C. Castro, Gloria C. Banganan, Girlie B. Obdamin, Lex C. Taguda, and Ernesto Tobias

Model's performance in upland farms were assessed in terms of collecting and storing rain water and in minimizing soil erosion. Dibble, strip-furrow, and broadcast, which are rice establishment methods, were superimposed as treatments to identify the most effective in minimizing soil erosion. The experiment was laid in RCBD with the alleys representing the blocks to minimize the effects of the differences in the slopes and fertility of the alleys. The storage tanks were filled-up during the rainy season and the collected water was stored without losses. Grain yield ranged from 5.08 to 6.96t/ha but was not significantly affected by the treatments. The high yield was due to favorable rainfall and the use of NSIC Rc 192. In terms of minimizing soil erosion, dibble and strip furrow resulted in significantly less eroded soil (10 and 10.2t/ha, respectively) than broadcast (12.9t/ha). This conformed with previous year's results showing that dibble and strip-furrow prevents soil erosion better than other methods.

Part of the study included determining the efficient use of the collected water for dry-season crops and the using of hedgerows for pest management. Using rice straw as mulch for tomato increased the yield by 17.01kg/plot and water use efficiency by 29.20kg/m^3 compared with the unmulched setup (15.48kg/plot and 24kg/m^3, respectively). For eggplant, yield increased from 15.17 to 17.79kg/plot with corresponding water-use efficiencies of 23.52 kg/m^3 and 30.54kg/m^3. The dominant insects were butterflies, wasps, fruitworm, pagong-pagong, and black ant. No significant damages due to pests were observed.

The system for rainfed lowland was set up in Casilan, Umingan, Pangasinan and PhilRice Batac, Ilocos Norte. The systems were retrofitted with solar pumping and drip irrigation. Full evaluation will be conducted next year.

Pre-Harvest and Postharvest Management of Aromatic and Organic Rice

Mary Ann U. Baradi, Jessica M. Solero, Gerome A. Corpuz, Marissa V. Romero, and Reynaldo C. Castro

Field experiments were established in typical irrigated lowland soil during dry and wet seasons in San Nicolas, Ilocos Norte to determine the effects of pre-harvest management (water, fertilizer) and postharvest management (harvesting time) on the yield, grain quality, phytochemical content, and antioxidant activity of aromatic and non-aromatic rice. The experiments were laid out in Split Plot design with three replications. For water management during DS, treatments assigned as main plot were: PalayCheck System, AWD, and farmer's practice. The varieties used in sub-plot were: modern aromatic Burdagol-Laguna Type, traditional aromatic pigmented Gal-ong, and modern non-aromatic PSB Rc 82. Water management technique had no significant effect on the yield of the three varieties; implying that AWD is indeed a cost-saving technology. The main effects of water management and its interaction with the variety on the amylose content, crude protein content, and antioxidant activity as measured by 2, 2'-diphenyl-picrylhydrazyl (DPPH) were determined. Milling potentials (brown rice, milled rice, head rice recoveries) and physical properties (grain length and shape) were not significantly affected by water management technique. For fertilizer management, two setups were established: (1) inorganic fertilizer using Leaf Color Chart or LCC vs. control (no fertilizer); and (2) organic fertilizer (chicken manure) vs. control (no fertilizer). The fertilizer treatments were assigned as main plots while three varieties (Burdagol-Laguna Type, Gal-ong, PSB Rc 82) planted on sub-plots. Inorganic and organic fertilizers significantly increased the yield of the varieties. For the experiment on harvesting, three varieties (Burdagol-Laguna Type, NSIC Rc 18, PSB Rc 82) were assigned as main plots while the harvesting treatments (30 days after flowering or DAF, 35 DAF, 40 DAF) were assigned as sub-plots. Results showed no significant effect of harvesting time on the yield of aromatic and non-aromatic rice regardless whether it was organically or inorganically-grown.

Development of Manually-Operated Rice Transplanter

Lex C. Taguda, Jasfer B. Francisco, and Mary Ann U. Baradi

The two-row transplanter was further assessed and evaluated at the station. Machine needs to be refined to obtain accurate data. Dsign of the 6-row manually operated transplanter was drafted based on an evaluation. Eighty percent of the 6-row manually-operated rice transplanter was already fabricated using parts and materials readily available in the market. Technical assessment, economical assessment, and adaptive testing will also be conducted.

Multi-Environment and Adaptability of Breeding Lines for Abiotic Stresses

Anielyn Y. Alibuyog, Melvin Andres, and Jonathan M. Niones

Twenty-eight rice entries were evaluated under saline- and submergence-prone areas in Brgy. Suso, Sta. Maria, Ilocos Sur from June to October. The entries were laid out in a Randomized Complete Block Design in three replications. The entries were managed following the recommended cultural management for rice in saline-prone areas. Salinity and water level were monitored throughout the growing period. The test lines and check varieties were exposed to high salinity (4dS/m) right after transplanting then escalated for a long week and reached up to 20.16dS/m from maximum tillering to panicle initiation. Diverse crop response was observed after exposure to stress and submerged condition. Severe chlorosis and necrosis of leaf tips were present among susceptible entries while others remained vigorous. Test entries were partially submerged caused by sea water intrusion and heavy rainfall during the vegetative and reproductive stage. Statistical analysis showed that the test entries were significantly different (Pr >0.01) in terms of yield and other agronomic parameters. PSB Rc 68 (subcheck), MS-MET-18, MS-MET-16, MS-MET-19, and MS-MET-27 were among the top performing entries producing more than 4t/ha, highest from PSB Rc 68 (4,785kg/ha) and MS-MET-18 (4,732kg/ha). Generally, yield production was positively influenced by panicle length (18-27cm), number of filled grains per panicle (63-141 per panicle), 1,000 seed weight (16-28 g), and harvest index (0.26-0.50).

PRISM-Field Monitoring of Rice Areas in the Philippines

Juanito M. Maloom, Nonilon I. Martin, and Jaybee A. Calapit

One hundred twenty-six (126) farmers' fields across Region 1 were monitored. Data on field profile (126), cultural management (126), crop status (526), crop cut and production data (no data), and rice and non-rice points (129) were collected over the two semesters. No crop cut and production data were gathered due to the Enhanced Community Quarantine. Five (5) typhoons (Pepito, Quinta, Rolly, Siony and Ulysses) and low-pressure areas were monitored. SRice production was not significantly affected in Region 1. Only Typhoon Pepito in Pangasinan and one low pressure area in the northern part of Ilocos province hit the region but caused minimal effect as weather disturbance did not occur at the peak of harvesting season. All field data collected were sent within three days after data collection and were stored in a database.

Available and validated data were submitted to the mapping team and were used for analyzing and interpreting synthetic aperture radar (SAR) imagery, calibrating the thresholds used for mapping, and assessing the accuracy of the output rice maps.

PhilRice was also requested to conduct a quick and supplementary survey on palay price during the harvest season. The maximum price of dry *palay* sold during October and November was P19.00 recorded in Rosario, La Union. Minimum price was P14.00 gathered in Banna, Ilocos Norte and Umingan, Pangasina. Low price was due to the peak of harvesting season and continuous rainfall. Meanwhile, the maximum price for fresh *palay* was P16.50 recorded in Paoay and Bacarra, Ilocos Norte, while the minimum was P10.00 gathered in Bantay, Ilocos Sur.

Field Performance of Micronutrient-dense Elite Lines for the Lowland Irrigated Areas

Anielyn Y. Alibuyog, Melvin S. Andres, and Emily C. Arocena

In 2020 WS, 98 micronutrient-dense elite lines and two check varieties (NSIC Rc 222 and NSIC Rc 460) were evaluated under favorable rainfed condition at PhilRice Batac Experiment Station. The treatments were laid out in a Randomized Complete Block Design with three replications. Analysis of variance showed significant differences among the treatments in terms of yield and agronomic characters. Among the 98 rice lines evaluated, pre-NCT 48 (IR16M1741), pre-NCT 2 (IR17M1655), pre-NCT 19 (IR17M1646), pre-NCT 82 (PR34627-B-44-2-1-2-1-2-1), pre-NCT 46 (IR16M1618), pre-NCT 1 (IR17M1647), pre-NCT 94 (IR 84847-RIL 195-1-1-1-1), pre-NCT 44 (IR18M1003), pre-NCT 70 (IR18M1112), and pre-NCT 14 (IR17M1293) were the top performing entries together with the two checks (NSIC Rc 460 and NSIC Rc 222) producing yield greater than 6t/ha. Higher yield production of these entries was primarily influenced by the production of more tillers per hill and longer panicles. Meanwhile, all entries had medium tillering ability ranging from 10 to 20 tillers per hill. Semi-dwarf height (<110cm) was also observed from the majority of the test entries. Pre-NCT 88 (IR 95133:13-B-19-10-21-GBS) was the tallest while pre-NCT 57 (IR17M1717) was the shortest in terms of height. On the other hand, maturity period ranged from 102 to 127 days after sowing (DAS) having pre-NCT 29 (IR17M1638) and pre-NCT 90 (IR 92195-411-1-1-1-1-1) as the shortest- and longest-maturing entry, respectively. Good to fair phenotypic acceptability was observed among the majority of test entries.

Development of an Integrated Crop Management Package for Rice in Saline-prone Areas for Increased Productivity

Nenita V. Desamero, Anielyn Y. Alibuyog, Bethzaida M. Catudan, Melvin S. Andres, Alfhie James Galanza, Sonia V. Pojas, Luzell S. Pungtilan, Bryan S. Pungtilan, Evelyn M. Valdez, Ma. Salome V. Duca, Jasper G. Tallada, Fredelyn O. Dela Cruz, Jonalyn Q. Polipol, and Reynaldo C. Castro

Field experiments were established in non-saline and saline areas in Sta. Maria, Ilocos Sur in 2017 WS to 2019 WS. Integrated Crop Management (ICM) included the use of Salinas 11, 12, 19, and 20 for areas with high salinity and Salinas 1, 16, and 21 for areas affected by both salinity and submergence. Package of technology (POT) was composed of planting 25-35-day old seedlings with a distance of 20cm x 20cm between hills and applying 80-30-60kg NPK.

The packaged ICM was validated in the pilot site and in the farmers' field. Results from the 2020 WS showed that ICM performed differently under varying field conditions depending on the occurrence of salt stress, its severity, growth stage of the crop, and rainfall. In the pilot site, Farmers' practice (FP) produced higher yield than the ICM due to the application of higher fertilizer rates and the flexibility in the timing of application. In the farmer's field, FP also produced higher yield due to favorable growing condition (salinity level was 0.05-1.0dS/m). Under high saline condition coinciding with the critical growth stage, ICM produced higher yield. The Salinas variety used in this study survived the moderately to highly saline condition while the variety used by the farmer did not recover. Grain quality of rice such as the physical attributes of paddy and rough rice, milling recovery, and physicochemical properties were also affected by salinity. Salinas varieties produced shorter, narrower, and lighter paddy rice under saline environment. Significantly higher milling recovery was also observed from non-saline environment. Brown rice and head rice recovery was also comparable. Rice in non-saline areas produced more chalky grains with higher amylose content. Sensory attributes of raw rice affected by salinity included color, glossiness, translucency, and hardness. For cooked rice, salinity only affects the color. Performing Salinas varieties were also seed produced in collaboration with the DA-RFO I.

Socioeconomic Profile, Management Practices, and Coping Mechanismsof Farmers in Saline Areas in the Philippines

Bethzaida M. Catudan, Fredelyn O. Dela Cruz, Jonalyn Q. Polipol, and Rhiza Mae A. Manglallan

Profiling of rice production in saline-affected areas and its farmers has not yet been comprehensively documented in the Philippines. Hence, this study was conducted to characterize the farmers growing rice in salt-affected areas and document their management practices and coping mechanisms. The characterization of saline rice areas was represented by 294 farmers surveyed nationwide in 30 municipalities of 22 provinces under all 15 rice-producing regions with coastal jurisdictions. Key informants from the survey sites were interviewed for supporting data and the situation of fields, irrigation sources, and other economic engagements of farming households in survey sites were photo-documented. Secondary data needed to enhance analysis were obtained from various sources.

Farmers identified nine sources of salinity in rice fields with overflow from brackish river during high tide and seawater flooding during sea level rise and storm surge as the most prevalent. Older seedlings were transplanted and lower rates of fertilizers were applied in saline areas. Rice varieties recommended for saline areas were not widely adopted. In many areas, farmers were not able to flush their

fields, a rudimentary management to dilute or reduce salt concentration when the problem compromised the survival of their rice crop because only a few had access to freshwater irrigation sources. The average rice yield penalty in saline areas was roughly 2t/ha in both seasons compared with that obtained by the farmers from their favorable rice areas.

Mechanized Seeding Technology: Improving Crop Productivity and Increasing Income in Rice-based Rainfed and Water Scarce Environments in the Philippines

Mary Ann U. Baradi, Anielyn Y. Alibuyog, John Eric O. Abon, Aurora M. Corales, Roel R. Suralta, Elmer G. Bautista, Edwin C. Martin, Crisanta S. Bueno, John Mark M. Bumanglag, and Cariel Q. Abad

The study aimed to develop the integrated best-management practices (BMP) for mechanized dry seeding for rice, corn, and legumes in rainfed lowlands and in tail-end irrigated areas and to validate the mechanized dry direct seeding technology package (MDDS) in Region I and CAR. The development of the integrated BMP for rice included research trials for crop establishment and nutrient management. Two research trials were established in Nueva Era, Ilocos Norte and Pidigan, Abra during 2019 WS. For the seeding depth (SD), the highest yield (2.46t/ha) was obtained from SD1 (2cm depth); however, there was no significant difference among treatments in terms of yield and yield components. The highest yield for seeding rate (SR) experiment (2.15t/ha) was obtained from SR120 (120kg/ha seeding rate); however, no significant difference was found among treatments for the yield and yield components. Grain yield in Nueva Era, Ilocos Norte was significantly affected by the nutrient management but not in Pidigan, Abra. In Nueva Era, the highest yield was observed from T7 (Ammosul) and T8 (Urea), applied three times at 0, 30, and 45 DAS, with a yield of 2.35 and 2.13t/ha, respectively. The highest yield in Pidigan, Abra was obtained from T6 (Urea applied at 30 and 45 DAS) (3.58t/ha), though not significantly different from the other treatments. Technology verification trials were established in 2020 WS to showcase the MDDS and compare it with traditional dry direct seeding technologies in Ilocos Norte. Four rice verification trials were established in Nueva Era, Ilocos Norte. Four treatments were laid in an area of 2,400m^2: multipurpose seeder (MPS) + BMP with recommended variety (drought tolerant variety) at 60kg/ha (MPS+ BMP + RV60), MPS+ BMP with recommended variety at 40kg/ha (MPS + BMP + RV40), MPS+ BMP with farmers' variety at 60kg/ha (MPS + BMP + RV60) and Farmers' crop establishment method and management practice with farmers' variety (FCE + FMP + FV). For corn, six verification trials were established to showcase MDDS and compare with traditional practices during the 2020 DS. Three treatments were laid in an area of 1,800 m^2: MPS+ BMP with recommended hybrid variety

(MPS+BMP+RHV), MPS+ farmer's management practice with recommended hybrid variety (MPS+FMP+RHV), and farmer's crop establishment method and management practice + farmer's variety (FCEM+FMP+FV). Time of operation and the number of seeds used were measured during the crop establishment. Agronomic data such as seedling emergence, plant distance, plant count, biomass, and grain yield were collected at various stages.

Development of Low Glycemic Index Rice through Induced-Mutation and Marker-Assisted Selection

Mae Rose M. Maoirat-Abad (Project leader), Teodora E. Mananghaya, Ria C. Yate, Rheumel Kheem A. Albano, and Harley Q. Gorospe

NSIC Rc 160 was mutated using gamma-irradiation and chemical mutagenesis. Five mutant populations were generated, (1) BIN-M01 – gamma-irradiated at 250Gy, (2) BIN-M02 – gamma-irradiated at 300Gy, (3) BIN-M03 – soaked to chemical mutagen, sodium azide (NaN3), at 1mM for 6h, (4) BIN-M04 – double mutagenesis at 250Gy + 1mM NaN3 for 6h, and (5) BIN-M05 – double mutagenesis at 300Gy + 1mM NaN3 for 6h.

The M_1 generation was bulked and planted with a minimum of 2,000 hills per population (Figure 1). Leaves from the resulting M_2 population were collected. Likewise, leaf discs from 20 plants of the same generation were bulked to be used for bulk segregant analysis (BSA) and to detect lines with intermediate to high amylose content using molecular markers. However, due to the community lockdowns, only leaf DNA extraction was done and some initial optimization of the molecular markers. A total of 9,401 M3 lines were from the five different populations in 2020 WS.

For the agro-morphological characterization of the mutant lines, plants that mature earlier and later than NSIC Rc 160 wild type were noted. Lines that are taller, have longer and denser panicles, low fertility, and have different grain shapes were also noted. The response of the lines to pests and diseases were also recorded.

Simulating Hybrid Rice Yield Using Decision Support System for Agrotechnology Transfer (DSSAT) Model under Various Growing Environments

Juanito M. Maloom, Marilyn M. Yere

This study was conducted to evaluate and validate the performance of the calibrated 14 cultivars composed of 5 hybrids, 4 maintainers, 4 restorers, and 1 check variety in the irrigated and rainfed environment. Based on the computed grain yield, the check variety (NSIC Rc 222) performed well in the multi-location yield trial sites in Science City of Muñoz Nueva Ecija; Batac City, Ilocos Norte; San Mateo Isabela; and Davao in 2019 WS. IR 73013R, a restorer line, performed well in DA-Western Visayas Agriculture and Research Consortium and San Mateo, Isabela. Mestiso 20 and Mestiso 32 also performed well in SPAMAST, Davao and attained 10t/ha. To further validate the performance of hybrids, three field set ups were established in 2020 WS in Brgy. Tabug and Rayuray in Batac City and Brgy. Bugasi in Banna. Results showed that Mestiso 55 achieved the highest yield followed by Mestiso 20. The performance of Mestiso 20 in two locations were comparable and were higher than yield of the check variety (NSIC Rc 222). Mestiso 1 yield better in Banna than in Tabug due to sufficient irrigation in the area.

Multi-Environment Field Performance Evaluation of Elite F1 Hybrids and Parents (PhilRice Batac, 2020 WS)

Mae Rose Maoirat-Abad, Ria C. Yate, Rica Mae G. Gomez, and Cesar V. Solero

Under the rainfed lowland ecosystem, 39 entries consisting of F1 elite hybrids, maintainer, and restorer lines and 4 check varieties were evaluated at PhilRice Batac, Ilocos Norte during 2020 WS. The experiment made use of 117 plots measuring 4m x 4m planted in 20 rows by 20 hills with a planting distance of 20cm x 20cm apart. The treatments were laid out in a Randomized Complete Block Design with three replications. Fertilizer rate of 148-60-60kg NPK/ha was used at 4 split applications based on previous Minus-One Element Technique (MOET) results. Based on the initial data, two elite F_1 hybrids - PR50920H and PR44568H - were identified to outyield the four check varieties with 7.45 and 7.16t/ha, respectively. Six (6) parent lines also yielded 6t/ha. Statistical analysis has yet to be conducted to prove the variability of the data.

Validation of Nutrient Uptake for Genotype-Specific Nutrient Management of Hybrids and Parents (Off-site)

Ailon Oliver V. Capistrano, Marilyn M. Yere, and Juanito M. Maloom

The study was conducted to validate the growth and yield responses of select hybrids to varying nutrient-uptake N levels in the favorable rainfed environment. It also measured the actual nutrient uptake of hybrids as to the nutrient applied based on nutrient omission plot technique (NOPT). Results showed that the local fertilizer recommendation, which was the result of previous MOET recommendation (2019 WS), had higher and comparable yield among the nutrient-uptake based recommendations. NOPT further showed that rice yield can increase around 20kg in every kg of N applied, 1.32kg of yield in every kg of phosphate applied, and 9.3 kg of yield for every kg of potassium applied. Thus, yield can be increased based on the nutrient applied and on the inherent nutrient supply in the soil.

Development of New Management Strategies in Increasing Rice Yield for Irrigated and Favorable Rainfed Ecosystem in Ilocos Region using Decision Support System for Agro-Technology Transfer (DSSAT)

Juanito M. Maloom, Marilyn M. Yere, Ryan Christian E. Manglal-lan, Jaybee A. Calapit, Nonilon I. Martin, and Reynaldo C. Castro

This study was conducted to determine the best crop management or combination of crop management strategies suited to maximize yield of rice using the DSSAT tool. Analysis showed that planting distance of 30cm x 15cm and five times fertilizer split applications had significant effect on the grain yield and other agronomic traits such as biomass of NSIC Rc 124H (Bigante). Biomass and tiller count were also higher in the experimental field of NSIC Rc 222 with 30cm x 15cm planting distance and five fertilizer split applications. Grain yield of NSIC Rc 222 was highest with 20cm x 15cm planting distance and five times split fertilization application at 150 kg N-level during the dry season. To further understand the mechanism of the best crop management options and predict yield, crop performance was simulated for the said varieties before the field experiment. Results showed comparable data between predicted and observed yield. Simulation further proves that yield can increase at wider planting distance during the wet season and at increasing number of fertilizer splits. Thus, DSSAT tool can now be used in determining the best combination of management practices and can mimic the real environment.

From the results, it is recommended that 30cm x 15cm planting distance and four to five fertilizer split applications using 150kgN/ha should be used during wet season. Meanwhile, 20cm x 15cm planting distance and higher fertilizer rate of up to 150kgN/ha for denser canopy is required during the dry season when less cloud cover and higher photosynthetically active radiation are eminent. It is recommended that further study be conducted to validate the initial results on canopy management and on increasing number of fertilizer splits.

Field Evaluation of FPA-approved Fertilizers for Irrigated Lowland Rice Ecosystem for the Packaging of Best Nutrient Management Technology

Nida Q. Abrogena, Marilyn M. Yere, Melvin S. Andres, Joel G. James, Wilfredo B. Collado, and Leylani M. Juliano

In 2020 WS, two FPA-approved fertilizers from Enviro Scope Synergy Incorporated and Northern Prime Trading Corporation were evaluated. One field setup using a mechanical transplanter was established at PhilRice Batacon July 31, 2020. NSIC Rc 222 was planted in a 1,000 m^2 area for each entry. Similar cultural management was applied by each participating company but had different nutrient management protocols. PhilRice Batac station was also evaluated to showcase the PalayCheck and MOET-LCC recommendation. Results showed that the PhilRice Batac entry produced the highest yield at 5,351kg/ha, followed by Enviro Scope Synergy Inc. at 4,853kg/ha and Northern Prime Trading Inc., the lowest at 4,052kg/ha. Highest cost (combination of fertilizer and labor cost) incurred was recorded from Northern Prime Trading Inc. (P15,648.00/ha), followed by the Enviro Scope Synergy Inc. with P15,632.00/ha and PhilRice Batac, P13,447/ha. In terms of net income, PhilRice Batac had the highest income of P88,195.42/ha. The results will be validated on the next cropping season.

Technology Applications and Promotions for Productivity

Sonia V. Pojas

The Technology and Applications Promotion for Productivity (TAPP) project promoted rice-based technologies and information developed by PhilRice. The project has five components: rice relay demo farm, vegetable demo farm, oyster mushroom production, vermicomposting, and promotion of rice and rice-based products. The promotion of rice and rice-based products, the core of the project, has the following sub-components: management of the Rice Science Museum and the station library, provision of information and technologies (knowledge products), training services, and responsive provision of knowledge products. Techno demos were also setup.

Component 1: Rice Learning Farm

Sonia V. Pojas, Juanito M. Maloom, Ryan Christian E. Manglal-lan, Jaybee A. Calapit, and Roger Teofanes F. Casauran

The Learning Farm showcased location-specific package of technologies for inbred rice suitable in Ilocos Norte and the three growth phases of rice simultaneously. The farm featured NSIC Rc438, PalayCheck System, MOET, and LCC. Supplemental irrigation maintained the setup amidst limited amount of rainfall Nets were also placed to prevent birds from damaging the panicles. Highest yield was recorded in July 2020 (6,086kg/ha) and lowest in April (4,540kg/ha). The yield surpassed the 2019 national yield average for both rainfed and irrigated ecosystems at 3,130 and 4,430kg/ha, respectively.

Component 2: Vegetable Learning Farm

Juanito M. Maloom, Jaybee A. Calapit, and Roger Teofanes F. Casauran

The vegetable learning farm or the GulayCheck Farm showcased Palayamanan technology. The technology was showcased outside the station to 15 farmers from Payao, Batac, Ilocos Norte. Generally, farm visits are suspended following IATF protocols. A total of 286 kilos of tomatoes, bitter gourds, ridge gourds, and eggplants were harvested from the setup, and were turned over to BDD for sale.

Component 3: Oyster Mushroom Production

Cynthiamay O. Lapat and John Resty G. Espiritu

Production of oyster mushroom was showcased.

The volume of production depended highly on the 190 fruiting bags setup every three weeks. Oyster mushroom conditions this year achieved an optimum growth at 80-85% relative humidity with temperature ranging 25-30°C.

Following IATF protocol, five farmers from Batac City and a farmer from Currimao were trained on mushroom production and grain spawn preparation.

Component 4: Vermicomposting

Sonia V. Pojas, Joe Mar G. Espiritu, and Felina G. Galanza

The technology on vermicomposting was shared and promoted to the trainees of the Rice Specialist Training Course from the four provinces in Region I. It was also presented to PhilRice staff undergoing a season-long appreciation course.

Three to four cycles of production were established using the enhanced technology particularly on pre-decomposition technology using the Effective Microorganism Activated Solution and alternate layer of piling of substrate. Technology bulletin containing the nutrient analysis was developed.

Component 5: One-Stop Information Shop

Cynthiamay O. Lapat, Florence B. Tolentino, Maribel B. Alupay, Benjamin A. Pajarillo, Jonalyn Q. Polipol, and Alexandra Yves M. Bermudez

The station distributed 27,899 copies of knowledge products to stakeholders in Ilocos Norte, La Union, Pangasinan, and Abra.

Two exhibits were showcased and technical experts and subject matter specialists handled six dispatches. The station conducted the 2nd batch of the Rice Specialist Training Course for 33 AEWs and LFTs of Region I on sustainable rice production with emphasis on PalayCheck and Appreciation Course on PalayCheck System.

As part of the celebration of National Rice Awareness Month, an online contest on poem writing and TikTok challenge were launched. The Be Riceponsible Campaign was promoted during briefings, training, and exhibits.

The station also continued promoting the Rice Science Museum, in which one briefing was conducted to the participants of the Training of Trainers. The station also sustained its linkage and collaboration with partner agencies.