2023 PhilRice R&D Highlights

BICOL BRANCH STATION

Philippine Rice Research Institute
Central Experiment Station
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STATION

PhilRice Bicol

Branch Director: VICTORIA C. LAPITAN

EXECUTIVE SUMMARY

DA-PhilRice-Bicol develops and disseminates strategies and technologies that will make rice farming in the calamity-vulnerable regions of Bicol and Eastern Visayas more resilient to climate change. The Station helps in increasing rice productivity by developing, adapting, and sharing technologies through the implementation of R4D projects in the rice communities, particularly in adverse rice environments such as saline-, drought-, and flood-prone, including upland ecosystems.

The Station handled nine research projects (Long-Term Soil Fertility Experiment, Rice Intensification and Sustainability Enhancement in Water-Scarce Rice Ecosystems in Masbate and Samar, PRISM, Fertilizer Derby, SMART Farm, OneRicePh, AFACI, and Operationalization of ABE Unit); and pursued four Development Projects (Rice SUSTAIN, Scaling ICM for Saline, RiceBIS 2.0, and 1 Special Project - Malusog Rice). Research projects and studies generated and validated field data and information to develop packages of technologies (POT) for specific environmental conditions. Development projects, on the other hand, utilized the data and information generated by research to extend and disseminate POT and catalyze scaling of mature technologies to appropriate rice environments and communities.

Core-funded Project 1: Long-term Soil Fertility Experiment (LTFE)

Gian Carlo C. Enot

Effects of the long-term use of inorganic fertilizers on rice productivity, yield gap, and soil fertility were assessed on-station under irrigated lowland rice environment during both seasons. Field experiments were conducted for 10 seasons with two varieties and a line (NSIC Rc 506, Rc 222, and PR43504-14-3-1-1) combined with six fertilizer treatments (Control, 100% RRF, 50%RRF+nanofert, 50%RRF+bioN, 50%RRF+vermi, 50%RRF+foliar) laid-out in RCBD plot design with three replications.

Results showed that Rc 222 (6.04 and 4.70t/ha), fertilizer treatment of 150-40-40 (6.95t/ha) and 100-40-40 (4.95t/ha), the line with both 150-40-40 NPK (7.1t/ha) and 50-20-20 NPK (7.1t/ha), and Rc 506 with 150-40-40 NPK (5.4t/ha) yielded highest in both seasons. Soil pH, soil NPK, and Zn remained in sufficient levels for 10 seasons. Yield gap trend for 10 seasons showed a relatively flat pattern ranging from 3.9t to 5.1t/ha.

Rice Intensification and Sustainability Enhancement in Water-Scarce Rice Ecosystems in Masbate and in Samar

Gian Carlo C. Enot

This project aimed to improve rice productivity in Masbate by increasing rice yield by 1t/ha and elevating gross income by 25%, and to evaluate the recommended technologies for rainfed, upland, and rainfed lowland rice ecosystems.

A field experiment identified suitable varieties in the rainfed lowland rice ecosystem in Matiporon, Milagros, Masbate, comparing NSIC Rc 568 and Rc 574 under two fertilizer rates (PhilRice Rate: 100-30-80kg NPK/ha and Farmer's Rate: 60-14-14kg NPK/ha). In the upland ecosystem at Igang, Masbate City, two setups identified the better establishment method (straight-row dry direct seeding vs. broadcast seed application) and suitable varieties using traditional rice Binagakay and Rc 568 under two fertilizer rates: farmer's rate (81-19-19kg NPK/ha) and PR Rate (100-30-80kg NPK/ha). Results showed no significant difference in yields: Rc

568 yielded 5.55t/ha, up by 3.41t/ha from the baseline yield and was identified as a good variety for rainfed lowland. For the upland, straight-row dry direct seeding yielded better at 3.69t/ha using Rc 568 and Binagakay, both with a fertilizer rate of 100-30-80kg NPK/ha.

Additionally, FGDs with six women and a man as participants were conducted to highlight their roles in rice farming. It was documented that men oversee the selection of rice varieties or crops, including quantity, and land preparation up to seed sowing. Women help select varieties in terms of yield, pest resistance, and eating quality. Farm monitoring tasks are equally shared, with women often managing fertilizer application and weeding; men do the harvesting.

In Samar, trial sites were characterized in rainfed and upland ecosystems to understand their unique conditions. The rainfed-lowland site in Brgy. San Jorge, Las Navas, N. Samar practiced two farming systems: Payatak system, which involved crop rotation and wet-transplanting with minimal fertilizer application, using a carabao that pulled a traditional plow called "karas" for land preparation; the Mechanized Rainfed system followed a monocropping approach with both wet and dry transplanting methods. NSIC Rc 472 and Rc 480 were planted at a seeding rate of 40kg/ha and a fertilizer rate of 100-30-80kg/ha NPK. The trials were laid out in RCBD with three replications.

In the upland trial sites in Suba, Silvino Lobos, and Poblacion, Lope De Vega, traditional varieties Kanukot, Kalinayan, and Makarato, and NSIC Rc 25, Rc 27, and Rc 29 were planted using various land preparation and planting methods, including dibbling and traditional land preparation with deep-placement/hill fertilizer application. Seeding rate was 40kg/ha, and fertilizer rate was 100-30-80kg/ha NPK.

Throughout the project, a gender-responsive approach was adopted, actively involving women in activities to promote gender equality and empower them in agriculture. The project's outputs included improved establishment methods, enhanced knowledge of suitable rice varieties, and sustainable approaches for land preparation and crop management. These outputs directly contributed to the project's goals of increasing yield by 1t/ha and enriching farmers' income by 25% as baseline. The project's findings have the potential to significantly enhance rice productivity in water-scarce rice ecosystems, benefiting farmers and contributing to food security in the region.

Philippine Rice Information System (PRISM)

Gina B. De Mesa and Don B. Bañares

The project aimed to sustain, maintain, and improve an online system that would consolidate and present timely information on the status of the rice crop. This information is essential to the DA in planning and decision-making to provide the most appropriate intervention that bridges production gaps. PRiSM uses data from SAR satellite images and smartphone-based field surveys to gather actual crop growth parameters including crop health, and process them using remote sensing software for rice and crop models. Primary and derived data from the process are further refined using GIS software for visualization, deeper analysis, and presentation.

In 2023, monitored were 441 farmers' fields across Regions 5 and 8. Data were collected from 220 fields in the first semester and 240 in the second. A smartphone-based survey gathered information on various aspects of the fields, including field profile (423 data points), cultural management practices (369), crop status (1794), production data (272), and validation points (510). Average data completion rates were high, ranging from 76% to 89% across regions and semesters. Region 5 achieved an average of 88.5% in the first semester and 76% in the second; Region 8 averaged 82.8% and 89% in the second half of the year.

Rice and non-rice area validation using purposive sampling yielded 256 and 254 data points respectively in the first and second semesters. A maximum of 120 points were collected per semester to ensure regional representativeness. These validation points were used to assess the accuracy of rice area maps generated.

Evaluation and Packaging of Fertilizer Products for Balanced Nutrition of Irrigated Lowland Rice (Fertilizer Derby)

Christian A. Barcelon, Don B. Bañares, and Kenji Gonzales

The Fertilizer Derby determined the best nutrient management package of technologies in achieving high productivity and cost-effectiveness of rice farming in a profitable, sustainable, and environmentally safe manner. It also provided opportunities for all players in the rice sector to show what can be done to improve yield and possibly diminish environmental pollution and contribute partly to the goals of sustainable development.

In 2023, nutrient management technologies from 5 (dry season) and 6 (wet season) participating private companies including PhilRice technology and farmer's practice were evaluated in terms of yield, unit cost of production, and input cost in the established fertilizer trial at the PhilRice Bicol Station under irrigated conditions.

The highest DS yield of 5.91t/ha was achieved by the technology of Gamechanger company using an NPK rate of 105 – 41 – 41 – 12S + Foliar with PhP10.85/kg cost of production. Envireau had the lowest cost of foliar fertilizers at PhP2.05/kg. Adamco yielded highest in WS at 4.42t/ha with an NPK rate of 169 – 42 – 42 + Foliar priced at PhP11.25/kg. Lowest unit cost of production was recorded at PhP8.69/kg by Xanadu company.

Scaling of Modern and Adaptive Rice Technologies for Prosperous Rice Farming Communities (SMART-Farm)

Marie Antoinette R. Orbase and Christian A. Barcelon

The SMART-ICM proposed a strategic initiative to tackle the limited adoption of mature rice production technologies developed by PhilRice. Despite the dissemination efforts, the sporadic deployment to target recipients or communities has hindered widespread adoption. The project focused on scaling out Rice Integrated Crop Management (ICM) technologies for transplanted rice (TPR) and direct-seeded rice (DSR) through a systematic technology transfer and farm cluster approach.

The SMART Farm Batang Cluster (RiceBIS Batang Farmers' Association), organized under RiceBIS 1.0 is composed of 45 farmers covering 55ha. The implementation took off during the dry season (DS) of 2024. Prior to takeoff, several project coordination briefings were conducted with potential partners and stakeholders who can facilitate implementation. The project has founded strong partnerships with the City Government of Ligao – CAO, Albay Provincial Agriculture Office, and DA-RFO5.

Operationalization of Agricultural and Biosystems Engineering (ABE) Unit in PhilRice Bicol

Melanie Aileen C. de Peralta and Zarah Lyn F. Tamang

PhilRice initiated the establishment of an ABE unit in each of the seven branch stations in 2018 to assess the status of agricultural farm machinery and post-harvest facilities, in line with the mandate of promoting agricultural modernization.

Initiated in 2021, the ABE Unit in Bicol went full blast by April 2023 after overcoming organizational hurdles. The unit established services covering land preparation, crop establishment, harvest, and postharvest activities; updated the inventory of existing farm machinery and equipment on-station and in the satellite station; conducted repair and maintenance of farm machinery and equipment; facilitated a re-tooling course on farm machinery operation, repair, maintenance, and troubleshooting for PhilRice personnel; and supervised on-the-job training for ABE students from the University of Eastern Philippines (UEP) Catarman in Northern Samar.

CORE-FUNDED PROJECTS - DEVELOPMENT

Branch Development Initiative (BDI): Rice SUSTAIN (Sustainable Technologies and Appropriate Information Needs) for Increased Productivity and Profitability

Rona T. Dollentas and Marie Antoinette R. Orbase

This project has 4 major components: (1) trainings, seminars, knowledge-sharing and learning (KSL) activities and technical expert-dispatching; (2) massive promotion of technology through distribution of PhilRice Knowledge products (KPs), conduct of exhibits, and use of PhilRice Text Center (PTC) and social media as digital platforms; (3) establishment of technology demonstration farms such as the Palayamanan, and on-station and off-station varietal demonstration activities and (4) putting up of Binhing Palay Farms to accelerate the dissemination and adoption of rice varieties for adverse environments; and scaling of Integrated Crop Management (ICM) for saline-prone rice ecosystems in Bicol Region. Through

active collaboration and partnership with various public and private entities in the covered regions, all target activities were successfully carried out.

In 2023, six Palay-Aralan, one skills enhancement training for farmers, one mushroom production training for students, and one capacity-development staff training were pursued. PalayAralan widened the reach and improved the knowledge and skills of rice farmers, particularly in the remote and low-yield rice-producing Samar Provinces. In addition, three on-the-Job training, 15 technical experts-dispatching, and one Lakbay Aral were catered to.

Distributed were 64,160 copies of various kinds of PhilRice KPs/IEC materials across Bicol and EVR. KPs and IEC materials were made accessible through the One-Stop Information Shops (OSIS) opened in State Universities and Colleges and Palaytambayans in Farmers' Association Offices, FITS Centers in LGUs, and others. PhilRice KPs were also disseminated to 1,141 clients during station visits, trainings, Lakbay Palay, and various RDE activities of the station.

Our Facebook page, with 13,164 followers this year (31% increase from 2022), published 134 original posts and 175 shared posts on production technologies, information, and the station's rice RDE updates. PhilRice Text Center recorded new registrants of 46,109 in 2023 (55% from Bicol and 45% from EV).

Yield performance and adaptability of 7 inbred, 1 public and 2 private hybrid varieties during the DS; and 9 inbred, 2 public, and 4 private hybrids during the WS were demonstrated at the station, together with Abonong Swak and use of the transplanter. Our Palayamanan model farm showcased additional sources of income aside from rice, and promoted biomass recycling with vegetables, mushroom, and vermicomposting and aquaculture components. Also participated in were the rice derby organized by the DA-RFO8, Provincial Hybrid Rice Cluster Farm Demo in Naval, Biliran showcasing 3 hybrid and an inbred varieties. Ninety-one Binhing Palay farms were put up across Bicol and EVR in 2019-2022 to introduce varieties for adverse environments.

The scaling ICM project for saline is set to expand in Canaman, Camarines Sur and Sta. Magdalena, Sorsogon. After the 3rd cropping of implementation in Tiwi, Albay this WS 2023, a notable increase of 1.38t/ha (42.86%) from the baseline yield of 3.22t/ha was observed. Seven Lakbay Palay episodes were accomplished, 6 of which were initiated by the station, and one was organized by the DA-RFOs for the rice derbies; participated in by 1,872 individuals (53% men, 47% women). The activities conducted and co-facilitated under this project have engaged 21,272 clients, consisting of 9,828 (46%) men and 11,444 (54%) women, marking a 39% increase from the previous year.

Rice Business Innovations System (RiceBIS 2.0)

Melanie Aileen C. de Peralta

RiceBIS 2.0 aimed to link rice farmers and agri-entrepreneurs to new markets and increase their profitability. The program is composed of three components: (1) Process Innovations: Transforming Farmers toward Value Chain-Oriented Rice-Based Farm Cluster Enterprises, (2) Product Innovations: Integrity Assurance for Safety and Quality, and (3) Marketing Innovations: Linking Farming Communities with the Market.

Three communities in Albay, and in Milagros and Mandaon (Masbate) were the take-off sites for RiceBIS 2.0. The business capacity of each cluster was assessed and Balangibang FPPFA scored 77. 83% (medium capacity). Baclay ARBC (Milagros) scored 63.33% (medium capacity). Cabitan MFAC scored only 42% (low capacity). These assessments have helped the program pinpoint the needs in strengthening each community.

For component 2, product certification and standards were the primary focus to assure safe and quality products in support of marketing. Training on Good Agriculture Practices (GAP) certification and Product Standards were each conducted in Albay and Masbate. For Marketing Innovations, a farmers' forum and commitment-setting were done in Masbate. Training on costing and pricing was also offered.

The BIDA RiceBIS, Be the Rice Best campaign was launched during the National Rice Awareness month celebration of the station, which was participated in by RiceBIS farmers in Albay and partners from different sectors. This is part of the campaign to boost the market of products from RiceBIS Communities not only in Bicol but across the country. For the Policy, Monitoring and Evaluation (M&E), the Masbate communities have been actively promoting their products in different exhibits and fairs such as the Rodeo Masbateño Festival and the Kiwanis International Philippines Luzon District Convention. These have been one of their major sources of income aside from their regular buyers of milled rice and machine rentals.

OneRicePH: Development of Product Concepts for Target Rice Market Segments and Establishment of the National Breeding Network (Module 2. Stage 1-MET (Dry Direct-Seeded Rice)

Marie Antoinette R. Orbase and Mary Jane B. Besmonte

Rice yields are low in variable and unpredictable environments (e.g., drought and salinity submergence-prone areas). Thus, the challenge is to optimize Genotype by Environment that matches farmers' expectations and needs including their ability to handle risks.

In the drought-stress DS trial conducted in Tambangan, San Jose, Camarines Sur, measly harvests due to severe pest infestation and drought stress from vegetative to reproductive stages hindered the identification of top-yielding lines among the test entries. The WS trial in San Isidro, Oas, Albay was severely rained on from its reproductive stage onwards. PR54039-551-B-B stood out as the highest-yielding breeding line, producing 4,984kg/ha. Seventeen breeding lines performed better than the highest-yielding check variety—NSIC Rc 25. In the WS salinity-submergence stress trial conducted in Mayong, Tiwi, Albay, entries manifested dynamic responses from vegetative to reproductive stages. Some entries even recovered from severely retarded growth to nearly normal growth. Submergence was aborted as the water level receded rapidly. Notably, a breeding line outclassed the leading check variety, NSIC Rc 426, by producing 5147.5kg/ha.

Scaling Integrated Crop Management for Salt-affected Rice Environments in Albay and Camarines Sur

Rona T. Dollentas and Marie Antoinette R. Orbase

The project was initiated in WS 2022 and continuously expanded its sites in the Bicol Region to address the effects of salinity in rice production through a community-based technology demonstration approach. The pilot site was established in Tiwi, Albay with 10.37ha comprising 4 barangays; expansion site in Canaman, Cam Sur

involved 30ha spread in 3 barangays where baseline information was gathered and site characterization was conducted to determine its suitability.

Salinity levels were monitored across seasons in Tiwi; DS 2023 was spared from high salt intrusion, thanks to prolonged heavy rains. Yet, the heavy rains necessitated replanting, untimely fertilizer application, causing fewer tillers, and unfilled grains; the baseline yield of 3.51t/ha diminished by 740kg. For WS 2023, harvest rebounded by 1.38t/ha (42.86%) from the baseline yield of 3.22t/ha. Low to moderate salinity levels were recorded across sites.

Malusog Rice Program

Victoria C. Lapitan

Ensuring the availability and accessibility of quality Malusog Rice seeds and milled rice for supply is one of the main objectives of the project. With this, its technology-demonstration in target provinces established 6.48ha., with the highest yield of 5.8t/ha. The sites were showcased to farmers following stewardship protocols to achieve optimal yield, increasing awareness on the use of quality seeds and crop management based on PalayCheck.

The successful integration of Malusog Rice into local agri-nutrition programs in Regions 5 & 8 made it available to nutrition-deficient households. Overall, the Program has reached nine provinces under pilot-deployment and outside areas: Camarines Sur, Norte, Albay, Sorsogon, Masbate, Catanduanes, Northern Samar, Samar, and Leyte. These efforts have engaged over 3,000 individuals such as farmers, consumers, stakeholders, and the public, by way of various outreach activities rolled out through briefings, feedings, distribution, promotional events, and market tests.

EXTERNALLY FUNDED PROJECTS

Stress-tolerant and high-quality rice varieties suitable for direct seeding in AFACI member-countries

Marie Antoinette R. Orbase and Mary Jane B. Besmonte

Salinity is one of the most important stress conditions other than high and low temperature, and submergence that affect our farm communities. Rice must be genetically improved to become resilient to abiotic stresses. Screening rice

breeding lines under these adverse conditions is imperative so that farmers in these marginal areas can increase their produce and income. Hence, in 2023, 130 rice breeding lines and 10 check varieties (global and local checks) laid out in Augmented RCBD were evaluated under non-stress during the DS at PhilRice Bicol for seed increase; and non-stress and saline-stress evaluations in WS in Malinao, Albay. In DS, 32 (25%) of the breeding lines outperformed the highest-yielding check NSIC Rc534 (7834kg/ha).

In WS, the breeding lines were exposed to severe cycles of salinity stress and drought during the vegetative until reproductive stage with EC levels ranging 6-22ds/m. Only 38 (29%) survived with a salinity score (based on SES) ranging from 7 to 9, and plant survival ranging from 1 to 38%. Consequently, under non-stress conditions, 2 breeding lines out yielded the three highest checks; 29 (22%) entries surpassed the check population yield (4939kg/ha).