

2020

PhilRice R&D Highlights



PhilRice Los Baños

Contents

SECTIONS	PAGE
Executive Summary	3
RiceTIP: Rice Technology and Innovations Promotions in Regions IV-A and IV-B	9

PhilRice Los Baños

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EXECUTIVE SUMMARY

Guided by the PhilRice Strategic Plan, Philippine Rice Research Institute Los Baños (PhilRice LB) continues to implement relevant research, development, and extension initiatives to contribute to achieving PhilRice's goal of a rice-secure Philippines amidst the new normal. As a result, despite the negative impacts of the pandemic on the world trade, businesses, working systems, and daily living of the Filipino communities, particularly the agricultural workers, the station managed to discover ways to achieve most, if not all, of the branch's expected outputs.

PhilRice LB primarily serves the R4D needs of Regions IV-A and IV-B and caters to the national hybrid rice program. Nestled strategically within the Los Baños Science Community and close to the National Capital Region, PhilRice LB maintained collaborative initiatives with the University of the Philippines Los Baños (UPLB), the International Rice Research Institute (IRRI), and other members of the R&D network to respond not only to regional issues besetting its areas of coverage but also those that are interregional or national. For this year, PhilRice LB implemented five program-based, two station-initiated, and three externally-funded R4D projects. In addition, a total of 26 core-funded studies were conducted by the station, 16 of which were under the Research Sector and 10 under the Development Group.

To give the best to our farmers, the branch has initiated this year a study on how to further ensure delivery of pure hybrid parental and F1 seeds. In line with this, the applicability of alkali digestibility test as a rapid method to assess genetic purity of hybrid parental lines of Mestizo 1 and Mestizo 20 was explored. The parents of M1 and M20 were characterized based on their alkali spreading response to varying KOH concentrations. Based on the alkali spreading value (ASV) profile of true-to-type lines, IR58025A and IR34686R had distinct ASV scores of 4 and 5, respectively, at 1.1% KOH concentration. IR34686R differentiated from the rest of the genotypes tested at 1.1% and 1.7%. TG102M was likewise discriminated at 1.7% and 2.0%. The preliminary results were promising, which showed that IR58025A, IR58025B, and PRUP TG102 had distinct ASV scores at 1.1%, 1.8%, and 1.7% KOH concentrations, respectively. These results will be validated while concentrations to differentiate IR58025A and IR58025B will be further explored. Correlation of genetic purity measured using alkali digestibility test and grow out test will be conducted once all parent lines have been distinguished using this marker.

The station also shares its efforts to conserve genetic resources of rice and *Azolla* species. The station currently maintains 3,445 rice accessions that include traditional rice varieties (TRVs), hybrid and inbred breeding lines, original seeds of

EXECUTIVE SUMMARY

public hybrid released varieties, and selected National Cooperative Test (NCT) lines. For this year, 357 accessions were seed increased/regenerated and processed for storage (112 traditional varieties and 245 elite breeding lines), 245 of which were partially characterized. On the contrary, the 260 accessions of *Azolla* species housed temporarily at the station were properly turned over to the National Plant Genetic Resources Laboratory at UPLB for conservation in February 2020.

Hybrid rice research is continually being pursued in close partnership with the PhilRice Hybrid Rice Program. Fourteen (14) fixed lines were selected as potential new TGMS lines, while seven pollen parent lines have been identified with good combining ability from the pool of male parents developed through the TGMS rice breeding project. Two promising hybrids from the hybrid preliminary yield trials will advance for further evaluation in 2021. The seed production protocol for the previously identified promising experimental hybrid (AYT 191) has been completed.

PhilRice Los Banos remained the sole source of nucleus and breeder seeds of public hybrid rice parentals. For this year, though, most of the nucleus and breeder seeds activities were affected by the lockdown caused by the pandemic and the series of typhoons that hit Southern Luzon towards the end of the year. Nevertheless, the project had stored buffer stocks of breeder seeds amounting to 1,035kg IR58025A with the corresponding B-line and 300kg PRUP TG102 that can be dispatched anytime. Some 305kg IR34686R and 475kg of TG102M breeder seeds are also available. A total of 315kg female parents and 55kg male parent line breeder seeds of Mestizo 1 and Mestizo 20 were distributed to PhilRice Isabela, Midsayap, and Negros for foundation seed production. Seeds of parental lines of 20 public released hybrids are also maintained at the station in modest amounts and may be requested for research purposes. Basic hybrid rice seed research was also implemented in the station. In 2020, five promising hybrids (three CMS and two TGMS) were characterized and evaluated for their basic and F1 seed production capacity. However, problems on the identity and performance of the parent lines of two of the CMS-based experimental hybrids were noted. Thus, further evaluation will be done later once the breeders forward true-to-type seeds. On the other hand, seed production protocols of the two promising TGMS-based experimental hybrids were established this year.

For the grain quality screening of TGMS breeding materials, nine of the 573 entries evaluated were identified with good milling potentials and good eating quality with intermediate AC and intermediate/high intermediate GT based on AC-GT combination. Evaluation for reactions to major insect pests and diseases were likewise done on TGMS parentals (TGMS or S-line and Pollen parents or P-lines) using the induced method. Of the 193 hybrid parent materials evaluated for their reaction to major insect pests, 88 and 30 entries were resistant to GLH and BPH, respectively. On the other hand, 196 TGMS breeding materials were also screened for reactions to major rice diseases. Evaluation results under the induced method showed that one and nine entries were resistant to rice blast pathogen during the 2020 Dry Season (DS) and Wet Season (WS) trials, respectively. Likewise, pedigree nurseries (F4 and up) and hybrid trials were evaluated for reactions to major insect

EXECUTIVE SUMMARY

pests and diseases under field conditions. All scores for the grain quality and insect pest and disease evaluation of TGMS breeding materials were submitted to the breeders.

Concurrent to the aforementioned program-based studies, the Philippine Rice Information System (PRISM) is implemented. In partnership with RFOs, regular data collection continued in selected monitoring fields. Tracking of 80 monitoring fields was done. A total of 480 validation points, whether rice or non-rice areas, were checked across the two regions. Stratified rice and non-rice area validation were also conducted by the 1st quarter of the year in Palawan and Quezon province. These data were used to generate seasonal rice area, the start of season maps, and yield estimates. Regular monitoring, national retooling, and evaluation workshops were also conducted through an online platform to capacitate regional facilitators and update PRISM protocols. Outputs and information generated through PRISM can now be accessed on their website <https://prism.philrice.gov.ph>.

To complement the research efforts of PhilRice LB, the Development Group of the station crafted and implemented projects that focus on promoting rice awareness that will eventually result in the adoption of science-based rice innovations and practices. Studies under the projects focused on establishing active partnerships and linkages among rice stakeholders towards improved productivity, increased income, and enhanced competitiveness of the rice farmers. The Branch Development Initiative project entitled, “Rice Technology and Innovations Promotion in Regions IV-A and IV-B (RiceTIP),” was implemented mainly to effectively share knowledge, information, farming innovations, and newly-developed mature technologies to rice stakeholders. The project employed two studies: (1) RiceSHARE: Capacitating Rice Stakeholders through Knowledge, Sharing, and Learning Activities in Regions IV-A and IV-B; and (2) RicePATROL: Providing Assistance to the Rice-Farming Organizations in Target Locations. However, due to restrictions brought about by the COVID-19 pandemic, activities targeted to be conducted this year were modified to conform to the prescribed safety protocols.

The RiceSHARE study disseminated rice science and technology information using PhilRice’s knowledge products (KPs) and information education communication (IEC) materials. A total of 3,200 IECs and KPs were distributed to rice farmers and stakeholders in CALABARZON and MIMAROPA regions in 2020. These materials were strategically distributed in Palay-Aklatan or the mobile One-Stop Information Shop (OSIS) in two collaborating schools during the thematic exhibits set up by the station and Local Government Units. This year, the OSIS at the station catered to only 147 visitors, which is 49% lower compared to 2019. On the other hand, merely three thematic rice exhibits were showcased in 2020; the values likewise showed a sharp decrease of 73% compared to 2019. Something new for the station was the participation in the conduct of an interactive online exhibit for SyenSaya organized by the Los Baños Science Community Foundation Inc. (LBSCFI). Further, acknowledging the importance of the information generated through the joint R&D efforts, continuous development of a database for all R&D documents is being pursued as well. To date, about 8,000 files were uploaded in eight different Google Drive accounts for easy access to staff.

EXECUTIVE SUMMARY

The COVID-19 pandemic has offered unique opportunities for organizations to adjust to the new working system and environment. Thus, station events catering to rice S&T technology promotions maximized the use of social media to convey rice matters to our clientele. The station has successfully shifted the Pinoy Rice Seminar Series (PRSS) into a Webinar Series with the theme “Shaping the New Normal.” Two webinars were launched via Zoom and Facebook live in 2020, discussing the role of agriculture amidst COVID-19 and the changing landscape of bringing food to the table. The webinars were able to reach out to 543 online participants composed of students, researchers, and PhilRice staff. On the contrary, the planned virtual Lakbay Palay and the Ceremonial Rice Harvesting at the Rizal Park to celebrate the National Rice Awareness Month (NRAM) were canceled due to the series of typhoons that damaged the crops to be showcased. For this year, the NRAM was celebrated by using a social platform with the theme, “Grow Local. Buy Local. Eat Local.” The Station uploaded two video clips on the official Facebook page of the station. The video clips featured two success stories of RiceBIS farmers from Quezon and the localized version of “Panatang Makapalay,” which is part of the Be Riceponsible campaign. Posted on November 26, 2020, it already has 14,063 views and 173 likes/shares. Similarly, the station offered a way to raise awareness on the agri-products of the rice farmers from CALABARZON through the Agri-Negosyo promotion ad also posted on the DA-PhilRice Los Baños Facebook. Furthermore, a total of 150 kg of brown rice was distributed to public markets in Laguna and Quezon to campaign the use of brown rice to the public. Along with the half-kilo of rice are some IEC materials on the nutritional benefits and cooking instructions for brown rice.

In RicePATROL, ___ batches of rice S&T training were conducted with the corresponding percent gained knowledge in parenthesis as follows: 1) K-12 Immersion on Basic Rice Production Training (43%); 2) Training of Trainers on Production of High-Quality Inbred Rice and Seeds, and Farm Mechanization (53%); 3) Two Batches of Appreciation Course in Rice Science and Technology for newly hired PhilRice Los Baños staff (198% and 125% for 1st and 2nd batch, respectively). Some immediate positive effects of the training include: eight students expressed to take agriculture-related courses in college, nine Farmer Field Schools were conducted by PhilRice-trained AEWs, and Rice Appreciation Course graduates expressing their increased understanding of rice S&T and its relation to their work as new staff in PhilRice. Forty-three (43) technical experts dispatch were provided to different requesting agencies. PhilRice Staff also provided technical assistance by phone or online, including 266 Facebook messenger queries, 36 emails, 65 text inquiries, and 27 mobile phone calls. Rice S&T updates were uploaded to the PhilRice LB official FB page totaling 185 posts, while the learning farm was used as a field demonstration area. It showcased the top five recommended varieties for Regions IV-A and IV-B, vegetable gardening, ecological engineering for sustainable agriculture, a hands-on training area for field operations in rice, and PhilRice matured technologies.

Two program-based Development projects are also lodged at the station, the Rice Seed System (RSS) and the Rice Business Innovations System (RiceBIS) Community.

EXECUTIVE SUMMARY

This year, the RSS in Los Baños focused on analyzing the seed flow in CALABARZON and the performance testing of five newly released rice varieties (NSIC Rc 506, Rc 508, Rc 510, Rc 512, and Rc 514). The project profiled the planting calendar in Region IV-A, which is useful in planning the seed production and distribution of higher seed classes done by the BDD unit of PhilRice Los Banos. It was noted that commercial rice production should be established in October for the dry season cropping and May for the wet season. The duration of the cropping season likewise varied such that the wet season extends up to four months while the dry season remained at three months. This information was relayed to the BDD group so that adjustments in their planting calendar may be made accordingly and seeds can be made available when needed by the clientele. On the other hand, the performance trial of five newly-released inbred varieties conducted during 2020 WS identified NSIC Rc 506 as a potential variety that can be recommended in CALABARZON. However, this variety is late maturing and was released for cultivation in the Visayas region. The complication in the seed production and distribution through government procurement channels may arise if this variety will be pushed as a recommended variety in Region IV.

The station likewise implemented Phase I and Phase II of the “Rice Business Innovations System (RiceBIS) Community” under the RiceBIS Program. For 2020, the project is geared towards improving the farmers’ rice production, the establishment of agro-enterprises, and market engagement of selected farmer’s organizations in Tiaong (Phase I) and Sariaya (Phase II), Quezon. For Phase I, the project achieved the following accomplishments: 1) Actively utilized PalayTxtmate and other social media platform concerning the marketing and entrepreneurship activities of the farmers; 2) maintained the PalayTambayan, which served as a mini-library for farmers for easy access to information on rice; 3) produced promotional materials and improved the packaging of black rice for its marketing; 4) assisted the farmer organizations (FO) in the engagement on three rice and rice-based enterprise; 5) developed an automated price computation for milled rice; 6) an increment of 0.5t/ha increase among the participating RiceBIS communities despite the severe irrigation problems; and 7) reduction of the average cost of production per kilogram of palay in the RiceBIS site to Php13.09/kg in 2019 WS from Php14.53/kg in 2020 DS.

Phase II of the project achieved the following: 1) Capitalized various media interventions such as PalayTxtmate, PalayKaalaman, PalayTalakay, Mindsetting and Knowledge, Sharing, Learning (KSL) activities, development and design of IEC materials; 2) conducted focused group discussions (FGDs) for Phase II implementation participated by 198 rice farmers from 14 barangays; 3) administered a refresher course and technical briefings on rice production and agro-enterprise development to 105 farmers (68 male; 37 female); 4) produced and distributed six sets of campaign materials to rice farmers and other stakeholders; 5) engagement of eight FOs in collective marketing of two identified enterprises; and 6) completed the benchmark data gathering for the communities participating in the RiceBIS Phase II.

EXECUTIVE SUMMARY

To maximize the research and development potential of the station, three extra-core funded R&D projects that benefit both regional and national rice stakeholders are currently being implemented. The station handles fund management of the NCT for the UPLB site, while Component A — Grain Quality Evaluation for Physical Attributes was conducted at PhilRice LB. For the NCT screening, only 295 entries harvested from 11 ecosystems during the 2019 WS were analyzed for chalkiness, immature grains, and grain size and shape following the NCT method of grain quality evaluation. Among the entries tested, five entries met the standard requirement for percent chalkiness, and 25.1% (74) met the standard for maturity with 43.1% (127) having long and slender grains, while only four entries passed the G1 percent chalkiness standard and had long, slender grains. However, field NCT tests during the 2020 DS was greatly affected due to the Covid-19 pandemic. Thus grain quality evaluation was postponed to 2021 DS.

Another DA-BAR project entitled “Development of Sustainable Rice Straw Management Practices and Technologies for Food (Rice Straw based Mushroom Production) and Bioenergy in the Philippines (RiceStrawPH)” was conducted with the assistance of PhilRice LB. In its last year of implementation, the project focused on the nationwide online promotion of the best practices for rice straw-based mushroom production and the machine prototype developed for rice straw processing. A policy workshop on “Accelerating initiatives for sustainable rice straw management in the Philippines” participated by Senator Francis “Kiko” Pangilinan and Under Secretary for Livestock Dr. Jonathan Santiago was also organized. A chapter on the best practices for rice straw-based mushroom production and rice straw mechanization chapter was included in a published book entitled “Sustainable Rice Straw Management.”

In its first year, the “Deployment of Genetic Resistance in the Management of Rice Black Bug *Scotinophara coarctata* (F.)” has documented the RBB biology in support of the establishment of rearing methodology of RBB. On the other hand, a study to measure survival and population build-up of RBB noted that the three-leaf stage seedling could support the development from the 2nd to the 4th nymphal stadium of RBB. Seedling bug burn or death of entries was observed faster with the fourth and fifth instar nymphal stage as the older insects feed more than the younger ones. Meanwhile, 859 germplasm materials were already assembled, seed increased, and characterized for important agro-morphological traits, ready for screening once methods for evaluation for reactions to RBB are established. Protocols for developing a methodology for linkage map assembly and QTL mapping were prepared, while an extensive literature search compiled much information about RBB.

RiceTIP: Rice Technology and Innovations Promotions in Regions IV-A and IV-B

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The conveyance of these rice technology innovations and updates to the general public, farmers, extension workers, and interested stakeholders was the goal of Rice Technology and Innovations Promotions in Regions IV-A and IV-B (RiceTIP). The project has two components, (1) Capacitating Rice Stakeholders through Knowledge, Sharing, and Learning Activities (RiceSHARE), and (2) Providing Assistance to the rice-farming organization in target locations (RicePATROL).

The RiceSHARE component conveyed comprehensive rice science and technologies through the new normal Knowledge Sharing Learning (KSL) activities and strategies. The outputs were: (1) maintenance of scientific journals, books, and IEC materials through the Palay-Aklatan; (2) distributed 3,200 rice S&T IEC materials to different stakeholders; (3) serviced 147 visitors in the station from January to March; (4) displayed the canvass paintings of Dr. Santiago R. Obien and National Scientist Bienvenido O. Jualiano in the Scientists' Corner, as well as the Farmers Gawad Saka Awardees in the Farmer's Corner at the Administrative Building station lobby and Palay-Aklatan, respectively; (5) Regional Map of the Areas of Responsibility (AOR), IV-A and IV-B, with rice crop statistics for display in the station and at social media platforms for finalization this December; (6) 8000 files uploaded in the Philrice online database which includes station R&D event photos (i.e. field walks, technology demonstrations, trainings), training PowerPoints, project protocols, reports, and minutes of meetings; (7) three thematic exhibits held in the science community and municipalities of Laguna; (8) two webinars for the Pinoy Rice Seminar Series (PRSS) attended by a total of 543 online viewers; and (9) four promotional activities including BeRiceponsible campaign activities in Los Baños, Laguna and Tiaong, Quezon in celebration of the National Rice Awareness Month, attended by 300 participants.

The RicePATROL component showed an improved rice S&T knowledge of stakeholders through technical assistance as resource persons, trainings, and technology demonstration. A total of four rice S&T trainings were conducted with corresponding knowledge gain as follows: (a) K-12 Emersion on basic rice production training [43%]; (b) training of trainers (TOT) on the production of high-quality inbred rice and seeds, and farm mechanization [53%]; and (c) two batches of appreciation course in rice science and technology for 28 newly hired PhilRice Los Baños staff [125% to 198%]. Other outputs of RicePATROL include: (1) dispatched 43 technical experts as per request from partner agencies and provided technical assistance through new normal strategies; (2) responded to

266 Facebook messenger queries, 36 emails, 65 text inquiries, and 27 mobile phone calls covering the topics from seeds to rice production operations, and postharvest practices; (3) 185 posts on new rice S&T updates through the DA-PhilRice Los Baños Facebook page; (4) field techno-demo of top five recommended rice varieties, matured technologies, and *Palayaman* Plus through the Learning Farm established at PhilRice LB.

The trainings resulted in the following positive effects: eight students expressed their interest in taking agriculture-related courses for college, trained AEWs by TOT were able to conduct nine Farmer Field Schools, and Rice Appreciation Course graduates expressed their increased understanding of rice S&T, which are useful in their work as new staff in PhilRice.

RiceSHARE: Capacitating Rice Stakeholders through Knowledge, Sharing, and Learning Activities in Regions IV-A and IV-B

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Rice science technologies were packaged into Knowledge Products (KPs) and Information Education Communication (IEC) materials and disseminated through Knowledge Sharing Learning (KSL) activities. The study aimed to effectively share knowledge and information using different KSL activities to intensify the knowledge of the general public and farming communities in CALABARZON and MIMAROPA regions through cost-efficient, climate-smart, and gender-responsive farm technologies. The component was divided into seven activities: 1) *Palay-Aklatan*, 2) Mobile OSIS in schools, 3) Database management, 4) Exhibits, 5) Visitors and station tours, 6) Webinar Series (PRSS), 7) Lakbay Palay, and 8) Rice Garden.

The Area of Responsibility (AOR) map featuring the different rice varieties recommended in Regions IV-A and IV-B was added to the OSIS of the station. A total of 8,000 files were uploaded in eight (8) different Google Drive accounts that serve as databases for easy access to its users.

Due to the COVID-19 outbreak, the outputs of the component study were affected, and methods of implementation were modified for some of the activities. The *Palay-Aklatan* and Mobile OSIS schools provided rice information to students, farmers, researchers, and visitors. However, the number of library visitors was reduced by 48.73% as there is no more face-to-face school setup. Only three exhibits requested by other agencies were accommodated. This is 73% lower compared to that accommodated in 2019. A total of 147 visitors (90% lower than in 2019) toured around the station and were briefed about the programs and

projects of PhilRice. For a wider range of audience, PRSS was modified into the Pinoy Rice Webinar Series. Two webinars were conducted during the 4th quarter of the year, with 543 views in Zoom and FB Live. The Lakbay Palay was canceled during the dry season due to the pandemic and typhoons. Similarly, the Rice Garden was not showcased to the public, although it was highly maintained for two cropping seasons. Activities in celebration of the National Rice Awareness Month were conducted only through social media, which includes: 1) promotion of agri-products of the rice farmers from CALABARZON, 2) localized Panatang Makapalay video, and 3) video feature of two successful rice farmers. The series of Facebook posts reached 14,063 views and 173 likes. A total of 3,200 IECs and KPs were distributed to different rice farmers and stakeholders in CALABARZON and MIMAROPA regions.

RicePATROL: Providing Assistance to Rice-Farming Organizations in Target Locations in Regions IVA and IVB

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PhilRice Los Baños assisted the rice-farming organizations in the target locations across Regions IV-A and Region IV-B through the following: 1) conduct of gender-responsive experiential learning activities on rice S&T and rice-based production system trainings and field technology demonstrations, and 2) dispatch of technical experts and assistance in Regions IV-A and IV-B.

Four rice S&T and rice-based production system training activities were conducted. These are the K-12 immersion on basic rice production training for 15 K-12 high school students; training of trainers on the production of high-quality rice and seeds and farm mechanization for 38 AEW participants; and two batches of appreciation course in rice science and technology for 28 new PhilRice LB staff participants. The participants' had significant knowledge gain for the K-12 Immersion on Basic Rice Production Training (43%), Training of Trainers on Production of High-Quality Rice and Seeds (53%) and Farm Mechanization (198%), and the two batches of the Appreciation Course in Rice Science and Technology (125%). A Learning Farm was established at the forefront of the station, showcasing a learning farm shed, vegetable garden, ecological engineering plants, top five recommended varieties for Regions IV-A and IV-B, and a hands-on area for land preparation operations. The station accommodated a total of 43 technical expert requests (38 from DA-ATI IV-A and 5 from DA-ATI IV-B) to serve as resource speakers on rice technologies. The scheduled activities under the Technical Expert Field Assistance were canceled due to travel restrictions. In turn, the station implemented strategies utilizing

PROJECT 1

social media under the new normal. Through its official Facebook page with 9,450 followers, DA-PhilRice Los Baños intensified its information dissemination efforts. As of December 2020, the station posted a total of 185 Facebook stories and reports and responded to 266 Facebook messenger queries, 36 emails, 65 text inquiries, and 27 mobile phone calls.

The station also supported the Department of Agriculture’s “Plant, Plant, Plant Program” or “Ahon Lahat Pagkaing Sapat (ALPAS) Laban sa COVID-19” program through the distribution of 1,420 vegetable seedlings to the residents of Gawad Kalinga Los Baños Ville. This initiative helped to provide a sustainable food source for the recipients amidst the pandemic.