

2023

PhilRice R&D Highlights



RICESEED SYSTEM



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Rice Seed System

Loida M. Perez

EXECUTIVE SUMMARY

The Program is designed to ensure rice seed sufficiency and facilitate a vigorous and sustainable rice seed supply chain in the country. Specifically, the program targets high-quality seeds of preferred rice varieties that are produced in sufficient quantity and available on time. This can be achieved by critical and holistic seed production planning coupled with the adoption of innovative approaches while ensuring capacity enhancement and training of the technical and labor pool who are involved in seed production at PhilRice CES and the branch stations.

The Program has four major component projects: seed production for food sufficiency (RSS-231); seed production for special market and informal seed systems (RSS-232); innovative approaches to seed quality and production (RSS-233); and rice seed digital convergence, policy, monitoring, and evaluation (RSS-234). In partnership with stakeholders, the seed production component of the program is expected to deliver and improve rice seed sufficiency with high-quality seeds as the primary output. In addition to market niche for special rice varieties, the program also enhances the local seed supply through the informal seed system in order to address the needs of our marginal rice farmers particularly in remote areas where the logistics of seed delivery is very costly. Innovations in seed quality of production are critical components to achieving high-quality seeds. Likewise, the application of modern tools for seed digital convergence of all stakeholders in the rice seed value chain will help hit the goal of ensuring that seeds are produced, available, and accessible by our farmers in a timely manner.

In 2023, parental lines of public hybrid varieties Mestizo 1 (M1), Mestiso 20 (M20), Mestiso 73 (M73), and Mestiso 99 (M99) were seed produced in conjunction with promotion, adoption by farmer cooperatives (F1 seed production), and dissemination to rice farmers and DA-RFOs. Seed kits of M73 and M99 were packed and distributed to DOSEPCO and S2R cooperatives in Mindanao to optimize their procedures for F1 hybrid seed production.

To support rice seed sufficiency in stress-prone rainfed areas of Pangasinan, Nueva Ecija, Iloilo, and Guimaras, production of source seeds of inbred varieties for the varmix technology generated 146 kg Rc214 foundation seeds and 210 kg Rc238 registered seeds.

Technical staff and field laborers went through 11 intensive training and practicum sessions on internal seed quality, crop health monitoring, and postharvest processing and storage conditions. These improved the awareness of BDD staff on field inspection and roguing, pest monitoring, and seed production efficiency as manifested in PhilRice Negros, CMU, and Samar satellite stations in 2023WS. Real-time pest advisories were provided in seed production areas.

The program piloted a project on local seed business (LSB) to enhance community-based seed supply in remote areas of Siquijor, which produced their preferred Rc160, Rc128, and PSB Rc18 varieties. The high-quality seeds doubled the yields of farmer-cooperators leading to higher income. Seeds of Calatrava, Arabon, Black Rice, and other pigmented rice were produced in PhilRice Negros, Bicol, and Agusan to eventually cater to special market niches and rice food products industries.

A desk review of reports and literatures on the rice seed supply chain saw constraints such as seed availability, extension services that reach the grassroots level, manpower, high input cost of production, insufficient seeds for adverse environments among other issues. Specific component activities of each of the four major RSS projects will be revised and re-aligned in 2024. All production efforts will converge under RSS-231 including the RCEF-funded basic seed production. RSS-232, which caters to the needs of special market and informal seed systems, shall also include heirloom rice seed production activities. The other components will also be redirected.

RSS-231: Seed Production for Food Sufficiency

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The RSS program focused on the production of public hybrid rice seed parentals, of M1, M20, M73, and M99. Evaluation nurseries were established and 2,207 entries of the M20 S-line were attended to. A total of 1,693 S-lines were selected based on trueness, pollen sterility, and agro-morphological characteristics in addition to grow out test.

We strengthened internal seed quality handling, crop health monitoring, and assessment of post-harvest seed operations and storage facilities at PhilRice CES and other stations. In collaboration with our Genetic Resources Division,

11 training sessions were conducted with intensive and practicum exercises to enhance the capacity of the technical staff and field laborers involved in seed production.

The project visited existing seed postharvest facilities of all PhilRice stations particularly paddy seed dryers, cleaners, and storage warehouses.

Early warning and monitoring help to detect the introduction of or sudden increase in the incidence of a serious pest before it develops into epidemic proportions. Major pests identified in seed production areas across branch stations were stem borer, brown planthopper, rice black bug, rice tungro disease, bacterial leaf blight, sheath blight, brown spot, and rodents. A total of 13 advisories were then released calling for management of these pests.

RSS-232: Seed Production for Special Market and Informal Seed Systems

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This project aims to establish a seed system that will produce and provide access to high-quality seeds of special rice and other locally preferred varieties in remote areas of the country through the informal seed systems. A baseline survey carried out in Camarines Norte, Northern Samar, Iloilo, and Negros Occidental had 101 farmer-respondents producing special rice. The survey determined the estimated area planted with special rice, seed requirements, and prevailing management practices. High-quality seeds of special-purpose and preferred traditional varieties (Calatrava, Red 64, Red 18, Arabon, Dinorado, and Total Black) were produced at PhilRice Negros. A seed multiplication trial of popular pigmented varieties (red and black rice) at PhilRice Bicol and Samar was established. The project released 500 kg of high-quality seeds to rice farmers in various provinces. To stretch the awareness of rice farmers about the availability of high-quality seeds of both released varieties and traditional rices, trials were established in Cabatuan, Iloilo; Jagna, Bohol; Catarman, Northern Samar; PhilRice Bicol and Negros.

We conducted a pilot project on establishing local seed businesses (LSBs) in far areas of Siquijor island province, particularly in San Juan and Lazi towns. Seeds of their preferred NSIC Rc160 and PSB Rc18 were produced and subsequently accessed by farmers nearby. Also, a techno-demo cum seed production of selected 500-series rice varieties was conducted. Capacity enhancement, KSL activities, training on improved seed production technologies and the establishment of an internal seed quality control committee were conducted.

RSS-233: Innovative Approaches to Seed Quality and Production

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To ensure and sustain the production of high-quality seeds. In 2023, this project initiated the development of high throughput molecular analysis using capillary-based multiplex DNA fingerprinting to ensure the genetic integrity of the seeds produced, thus providing high quality seeds to the farmers and stakeholders. The high throughput DNA analysis using capillary-based electrophoresis provides quick and accurate result to address the pressing issue of genetic identity of rice varieties. We have selected 41 markers from previous STR DNA fingerprinting research (Dalusong et al. unpublished) spanning the 12 rice chromosomes. Of this, nine were fluorescently-labeled with FAM, NED, and VIC selected from chromosomes 1, 2, 5, 6, 10, 11, and 12 for testing in a capillary-based electrophoresis platform (Table 6). Since PhilRice does not have this high throughput electrophoresis set-up, we have successfully forged a collaboration with the Philippine Carabao Center (PCC) Livestock Biotech Center for the use of ABI SeqStudio Genetic Analyzer for fragment analysis of rice samples. Initial testing of rice DNA samples of NSIC Rc506 and PSB Rc10 using RM274-VIC and RM171-NED, respectively, showed a single peak pattern consistent with the singleplex PCR procedure tested (Figure 6). Further selection and testing of STR markers for fragment analysis involved evaluation of the 35 STR markers in polymorphism survey and intra-variability test among 18 rice varieties. Minimal allelic variation was observed with only one to four alleles detected among the DNA samples of rice varieties. More rice varieties are expected to be screened to gather diverse alleles for better multiplex DNA fingerprinting protocol.

RSS-234: Rice Seed Digital Convergence, Policy, and M&E

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This project operates to understand the entire rice seed value chain and engage in digital convergence efforts via the Rice Seed Information System (RSIS) and blockchain technology in addition to activities on monitoring, evaluation, and policies affecting the local rice seed industry. To put effective and efficient rice seed systems in place, a value chain analysis is essential for understanding markets, and linkages/relationships of different players. A desk review on existing reports

and publications, secondary data collection, and preparation of data collection materials saw several challenges that hinder the performance of key players in the rice seed value chain. PhilRice, IRRI, UP Los Baños and private companies are involved in rice varietal development. Each of them employs different breeding strategies and practices. Many rice varieties are developed but rice breeding activities still need to adapt to changing environments. Seeds of stress-tolerant varieties are insufficiently produced and their use is not promoted. Extension services are also saddled with several challenges that need to be eased.

Production is a critical stage in making rice seeds available and accessible to farmers/seed growers in a timely manner. The integration of information and communications technology (ICT) tools is a smart strategy for better monitoring and traceability of seeds from the production of higher seed classes in breeding institutions. PhilRice and DA-BPI have therefore spearheaded the RSIS project that is being piloted in all PhilRice branch stations as well as among Region 3 seed growers' cooperatives in collaboration with the RCEF Seed Program. The RSIS enables a quick and more convenient process of documenting each activity during the higher seed class production, and the process of purchasing them from PhilRice up to the application for certification and laboratory analysis by BPI-NSQCS. The Rice Seeds Systems program aims to complete the documentation and traceability of the entire rice seed system as it collaborates with plant breeders, production specialists, seed producers, RCEF-Seed program, RSIS, traders/millers, and other stakeholders in bridging the missing links.

