NOTABLE ACCOMPLISHMENTS
(January to December 2021)

I. Executive Summary

DA-PhilRice has implemented 66 rice research for development (R4D) projects that developed yield-enhancing and cost-reducing technologies such as varieties, machines, and crop management options. These are promoted through trainings, field days, technology demonstrations, exhibits, and knowledge products and materials.

Essential Institute operations were sustained by strengthening and implementing covid-proofing policies and strategies. Strengthened linkages and close coordination with various partners and full use of online media platforms facilitated our work. Alternative measures and work arrangements were put in place to safeguard everyone's well-being.

II. Highlights of Physical Accomplishments and Success Stories

PILLAR 1: CONSOLIDATION
STRATEGY 1.1: BAYANIHAN AGRI-CLUSTERS

Rice Business Innovations System (RiceBIS)

1. *Clustering and partnership.* 23 RiceBIS communities were established across 16 provinces nationwide, engaging 194 farmer-clusters covering 5,786 rice farmers with 4,956.29 ha of farm area. Each community organized a site-working group (SWG) partnering with LGUs, DA and its attached agencies, academe, business and financing institutions, and other government agencies in support of farmers developing their agro-enterprises.

2. *Capacity building*. 6,658 farmers were trained: 4,156 in rice production and processing; 1,247 in organization-building and strengthening; and 1,255 in agro-enterprise development.

3. *Increase in yield and reduction in cost*. In 2016 to 2021, yield increases were **0.85 t/ha** (from 4.53 in 2017 dry season [DS] to 5.38 in 2020 DS), and **0.24 t/ha** (from 4.25 in 2016 wet season [WS] to 4.49 in 2020 WS). The increases (5.65% WS and 18.76% DS) were due to the adoption of recommended technologies and a favorable environment during DS. Cost of production was also pushed down to Php 12.4/kg in 2020 WS (Php 13.37 in 2016 WS), and Php 11.57/kg in 2021 DS (Php 13.26/kg in 2017 DS).

4. *Collective Marketing*. Across the 23 RiceBIS communities, 40 rice and rice-based agro-enterprises are being sustained and monitored for collective marketing. These include brown/pigmented/milled rice, custom service provision of farm machinery, crop production loans, agricultural inputs trading, rice brew, and seed and mushroom production. The communities are also linked to the National Food Authority (NFA), DA-KADIWA, rice millers, online/public markets, grocery stores, and institutional buyers. For DS 2021, farmers' income grew by 37% (from Php 17,510 to Php 24,005).

Water-Efficient and Risk Mitigation Technologies to Enhance Rice Production in Irrigated and Rainfed Environments (WateRice)

5. A rapid rural appraisal involving 150 farmers assessed a prospective site in Nueva Ecija for introducing the DA's Bayanihan Agri-Cluster (BAC) approach, and for evaluating the AutoMonPH-based irrigation advisory service (IAS). Almost all surveyed farmers in the Science City of Muñoz and Guimba were not familiar with the BAC but were convinced to join it.

STRATEGY 1.2: PROVINCE-LED AGRICULTURE AND FISHERIES EXTENSION SYSTEMS (PAFES)

6. In Quezon, 2,320 farmers were trained in rice production and organization-building and management. Five on- and off-station *Lakbay Palay* and nine farm walks conducted elsewhere highlighted nutrient management, PalayCheck system, and new varieties.

7. The 34 rice techno-demo farms established in different provinces showcased newly released inbred and public hybrid rice varieties, MOET, AWD, and location-specific nutrient management. A Ceremonial Harvesting was held on 25 November 2021 at the Rice Garden in Luneta Park. Nineteen (19) *Binhing Palay* Farms were put up mostly in the Bicol Region.

8. Five batches of online short refresher courses for various stakeholders were conducted: one for seed growers and four for farmers on the PalayCheck System in the Bicol and Quezon areas. A skills training for 31 women farmers on crop establishment, roguing, harvesting, and financial management was conducted. Three provincial hybrid rice derbies and one for fertilizer were established in Regions 1 and 12, respectively.

9. Information on trainings attended and conducted, recognitions received, and development intervention needs of seven PLGUs and 126 M/CLGUs in Central Luzon were gathered to serve as initial inputs to the Rice Development Intervention Monitoring System. Training on pest/nutrient management was conducted for 78 Bulacan farmers.

STRATEGY 1.5: DIVERSIFICATION

10. Under the PAG-AHON II project (June-Dec 2021), 30 farmers were provided with inputs and training in vegetable production and financial literacy. Another 50 home gardeners, also provided with seedlings, fertilizers, and farm tools, were trained in vegetable gardening and nutrition. New rice demo sites in Lupao, Nueva Ecija were established. A Harvest Festival was conducted on 13 November 2021 while a mass graduation of farmers was held on 9 December 2021.

PILLAR 2: MODERNIZATION

STRATEGY 2.1: TECHNOLOGY AND INNOVATION including DIGITAL AGRICULTURE

11. Platforms were developed for *Physical Inventory System, Rice Seed Production Traceability Monitoring,* and *Germplasm Management System*. Partnerships with IRRI and DA-BPI produced the Rice Crop Manager (RCM) and the Rice Seed Information System (RSIS), respectively. The RSIS seed ordering kiosk will be utilized for the 2022 DS planting. One seed growers' cooperative in Nueva Ecija also adopted the GrowApp. The RCEF-Seed Monitoring System evolved to facilitate a voucher-driven seed distribution modality.

12. The updated MOET App, released on Google PlayStore and downloaded on 9,480 devices with 3,087 active users, generates fertilizer recommendations. The Leaf Color Computing App has had 4,245 downloads and 292 active users. An app for rapid crop health assessment is undergoing beta-testing. The Weather-Rice-Nutrient Decision Support System (WeRise) Project, was handed over to DA-PhilRice for full operationalization.

13. PRISM has submitted the following outputs to DA-Central Office, DA-RFOs, DA-PhilRice Mancom, PSA, and PCIC: (a) monthly estimates of rice area and planting dates (municipal level, tabular data and maps); (b) two mid- and two end-season estimates of rice area and planting dates up to municipal level; (c) data on monthly/quarterly rice yield and production as requested by DA and RCEF; (d) weekly palay price data (January-November); (e) estimates of rice areas at risk and flooded by localized heavy rainfalls, tail-end frontal systems, LPA, and typhoons; and (f) 4 regular and 7 special bulletins.

    PRISM data products, accessible through www.prism.philrice.gov.ph, were used as reference in crafting DA Memorandum Order No. 58, and the recommended customization of planting calendars based on the climate type of the area. A total of 58 data product requests (rice area, yield, and production estimates in tabular and map formats) were successfully served with good to excellent ratings.

    Two online PRISM capacity-building activities for rice mapping and yield estimation were participated in by international and local partners. More than 300 implementers from 16 DA-RFOs participated in the national retooling on field data collection protocols. In celebration of the National Rice Awareness Month, PRISM presented its technologies to >300 youth nationwide to raise awareness about the digitalization of Philippine agriculture. A webinar on Digitalization of the Rice Monitoring System was participated in by >500 partners from the DA, DA-PhilRice branch stations, LGUs, academe, government, non-government, and private agencies.

14. The integrated and interoperable Rice Crop Manager Advisory Service (RCMAS 4.0) was formally transitioned to DA on-premise service in October 2021. As of November 2021, a total of 223,271 RCM recommendations were generated, with Region 2 having the highest (77,334) and BARMM the lowest (231).

    For the RCM research component, DA-PhilRice had established six on-station and 64 on-farm RCM trials across seven regions, 11 provinces, and 15 municipalities in the first semester of 2021 while 136 trials were conducted by the DA-RFOs. In the second semester, 176 RCM and 74 NOPT trials were established by the DA-RFOs.

15. A continuous-type gasifier-engine-pump system was developed and operated for 59.5 h from January to October 2021. The RiceIntel platform is connected to Ricelytics, serving as the data warehouse component. Smartphone application tools for managing farm operations, weeds, and seed variety selection were massively accessed.

16. Two high-level and one industry meetings, and an online survey about agricultural drones were organized, focusing on regulatory aspects, constraints in promotion, and some recommendations. DA Memorandum Order No. 63 was issued in October 2021.

17. For environmental sensing, 10 Internet of Things (IoT) nodes were developed to wirelessly transmit temperature and relative humidity data from the seed warehouses, greenhouses, and the field. A rapid method for the analysis of rice amylose, protein, and moisture content and GT was developed.

STRATEGY 2.2: FARM MECHANIZATION AND INFRASTRUCTURE INVESTMENTS

MACHINES: For land preparation

18. The final prototype of the gear-transmission power tiller with land preparation attachments was developed and tested. A final prototype of the riding-type boat tiller for deep mud is now available. An Isabela-based manufacturer is now commercializing the tiller.

For crop establishment

19. The working prototype of the gear-transmission power tiller with transplanter attachments was developed and tested. A pre-commercial unit of the localized multi-crop reduced-till planter has been fabricated and is now being pilot-tested in Isabela. Two working prototypes of the localized riding-type rice transplanter were fabricated.

For crop care

20. A three-row mechanized weeder for straight row-planted rice crop was fabricated and tested.

For harvest

21. The pre-commercial unit of the rice cutter-bar combine harvester was fabricated and tested in the Davao area. A working prototype of the stripper rice combine machine was field-tested.

For power generation

22. A prototype of an improved mobile dual fuel-fed single-cylinder diesel engine for water pumping was fabricated, and the rice husk gasifier-diesel engine system was tested. Up to 80% of the diesel fuel could be substituted by the producer gas fuel from the gasifier. The prototype was demonstrated during the training of 35 DA-RAED Agricultural and Biosystems engineers jointly conducted by DA-PhilRice and DA-BAFE on November 29 to December 3, 2021 in Nueva Ecija.

STRATEGY 2.3: CLIMATE CHANGE ADAPTATION AND MITIGATION MEASURES

Variety development and germplasm conservation

23. Eight PhilRice-bred inbred varieties were approved for commercial release, 3 of which are for irrigated lowland.

24. Elite lines for stressed and unstressed environments
    - 19 elite lines nominated to NCT for 2022 evaluation: 6 for saline-prone, 3 for rainfed-drought-prone and 10 high temperature lines with multi-trait tolerance or resistance to biotic and abiotic stresses.

- Two salt-tolerant varieties were identified as putatively tolerant to both drought and salinity stress at seedling stage. Another salt-tolerant variety was also submergence-tolerant at seedling stage, while two salt-tolerant varieties performed well under managed drought stress condition during the DS evaluation. A heat-tolerant variety exhibited drought tolerance at seedling stage.
- 2,821 (92%) of the 3,063 TRV germplasm accessions were agro-morphologically characterized; all 3,063 were subjected to the 16 STR molecular marker system.
- 1,106 inbred lines, CMS parent lines, and germplasm accessions were evaluated; 467 entries out of 625 CMS-based parental lines from 2020 WS and 2021 DS were analyzed for milling recovery, physical attributes, and physicochemical properties.
- 70 breeding lines, which are part of the core germplasm for hybridization, were evaluated for their rice blast and bacterial blight resistance; majority of 590 early-generation lines screened for grain quality met the standards for milling recovery, physical attributes, and AC.

Integrated Crop Management

25. Ecological and non-chemical ways of managing pests and diseases currently being developed include: (a) trap designs for rice bugs and rats, and baits for paddy eels; (b) canalet design that outsmarts golden *kuhol*; and (c) optimum seeding rate against lowland weed ecotype *Cyperus rotundus; 49* sampling areas for fall army worm infestation were identified and monitored monthly.

26. Soil information of 22 provinces were uploaded in the PhilRice Database Management Portal. Best alternative nitrogen topdress for organic-based nutrient management in normal, acidic, and saline paddy soils was assessed and determined.

Technologies for coping with climate change

27. *Palayamanan* technologies on continuous multiple cropping are being demonstrated; *Palayamanan* model farms were sustained in DA-PhilRice stations. (*These are also contributory to Strategy 1.5: Diversification*.)

28. A multi-purpose, typhoon-resistant, and low-cost structure (*Kwebo*) was erected for drying of paddy, mushroom production, or livestock and poultry raising. A working prototype of a multi-function farm equipment for land preparation with two attachments is being improved; a package of technologies for aerobic rice production system features the use of optimally laid out drip irrigation system as efficient means of utilizing water; best options for managing weeds, and water and nutrients (fertigation) is being optimized.

Rice and rice-based food and drink products

29. Three yogurt drinks with fermented rice bran were developed using NSIC-approved black and red rice as starter culture and dietary fiber source. Plain and strawberry-flavored thick yogurts (scoop-type) were also supplemented with pasteurized FRB to enhance their dietary fiber content; paddy-soaked GABA rice samples were dried, dehulled, and characterized for proximate composition, sensory properties, and general acceptability.

30. Rice-based food products being optimized for commercialization of RiceBIS partner-cooperatives in Zaragoza, Nueva Ecija include several variants of oyster mushroom chips (barbeque, spicy barbeque, salted duck egg) and squash-based products.

PILLAR 3: INDUSTRIALIZATION
STRATEGY 3.3: POSTHARVEST, PROCESSING, LOGISTICS, AND MARKETING SUPPORT

Machines for post-harvest

31. A working prototype of the combined conduction and far-infrared radiation (CCFIR) paddy dryer was fabricated, and its pilot unit was installed at a cooperative in Butuan City. Another unit is for installation and testing at KPKM Coop in Mapaya, San Jose, Occidental Mindoro. This is a collaborative undertaking among DOST-MIMAROPA thru DOST PSTC Occidental Mindoro, KPKM, DA-PhilRice, and Occidental Mindoro State College.

Machines for value-adding

32. The final prototype of a manually operated portable brown rice machine is undergoing 30-hour endurance testing. Three pilot units are ready for deployment in the branch stations; the first prototype of an infrared heating system for stabilizing brown rice to prolong its shelf life can process 40-80 kg of brown rice per hour.

PILLAR 4: PROFESSIONALIZATION

STRATEGY 4.1: AGRICULTURE CAREER SYSTEM

Human resources

33. Roughly 89% of our 333 plantilla and contractual positions are filled up. One GASS and five R4D personnel are currently pursuing graduate degree trainings in local and foreign universities; enjoying Magna Carta benefits are 153 personnel, of whom are 16 GASS personnel. Several peer recognitions from local, regional, national, and international award-giving bodies were received, including a Presidential Lingkod Bayan by the Civil Service Commission, Outstanding Young Scientist (OYS) by the National Academy of Science and Technology, and Outstanding Professional of the Year in Agriculture by the Professional Regulation Commission (PRC). Published in international and national SCI- and non-SCI-indexed journal publications were 38 papers, while 5 books, book chapters, and monograph were produced. Seven technologies were protected as utility models; one of which was also protected with industrial design.

34. Accreditation of the DA-PhilRice training courses with Continuing Professional Development (CPD) points under the PRC was institutionalized in 2021. Ugnay Palay: The 33rd National Rice R4D E-Conference, on its second accreditation, benefited some 355 rice stakeholders.

STRATEGY 4.4: EASE OF DOING BUSINESS AND TRANSPARENT PROCUREMENT

35. Surveillance and certification audits were successfully hurdled on 17-19 November 2021. Certification scope is Rice Research and Development, Business Development (Seed Production, Marketing and Distribution and other Products), Rice Competitiveness Enhancement Fund-Program Management Office, General Administrative Support Services, and Executive Management.

36. A total of 30 infrastructure and repair and maintenance projects amounting to about ₱236.4M were completed, bannered by the DA-CBC Laboratory and Plenary Building. Funds received (government subsidy) are responsibly managed as evidenced by 98% utilization rate. All DA-PhilRice stations produced more than 1,274 tons of registered seeds from the 367.43 ha area planted for the 2021 DS.

CUT ACROSS STRATEGY: STRATEGIC COMMUNICATION

Socioeconomics and Policy analysis and advocacy

37. Science-based information played a vital role in establishing data-driven policies and recommendations across fields in rice RDE. Updated rice-related data/statistics were provided to DA and other research institutions for decision-making, planning, scientific research, and reference purposes.

    Being maintained and updated (weekly, monthly, quarterly, and annually) are 74 PSA tables, with the latest data available in rice production, area, and yield as well as imports and exports, prices, supply, and demand. Results from the Rice-Based Farm Household Survey in 33 major rice-producing provinces are being made available through the PalayStat information system. In 2021, the system was viewed 17,671 times and accessed by 5,333 unique users.

38. Position papers, policy briefs/notes/memos, and infographics were crafted and submitted to the DA-OSEC, including:

    a) *Sources of rice production growth in Q1 2021 vs. Q1 2020*;
    b) *Validation report on low-quality rice*;
    c) *Inside Executive Order 135: Why lower the tariff on rice imports from non-ASEAN?;*
    d) *Analysis on imposition of a suggested retail price (SRP) on rice*;
    e) *Philippine rice supply and demand outlook for 2021 with price projections (as of 18 August 2021);*
    f) *Appropriate rice categories/classification to be used in the 2021 Family Income and Expenditure Survey (FIES) of PSA*;
    g) *Understanding the public investment on the rice sector*;
    h) *Policy note on sources of 2021 SEM 1 production growth*;
    i) *Policy note on 'Is increasing rice prices the solution to farmers' woes*?' and
    j) *Projected performance of 2021 palay production with estimated losses from Typhoon Odette*.

Three policy briefs on emerging rice issues were crafted and disseminated to lawmakers and partner-agencies as well as through news releases, national and local radio broadcasts, and social media.

Extension support, education, and training services (ESETS)

39. Knowledge-sharing and learning, and other information dissemination activities:

    Knowledge products
    - 27 (core) new/updated titles of IECs/KPs developed.

    PhilRice Text Center (PTC)
    - 57,721 new clients registered; 91% of 33,274 text messages and 1,926 call queries received were responded to; and 13 Ricetips text blasts were disseminated to registrants.

    Media relations
    - 50 radio segments on topics related to regular DA-PhilRice core programs, hybrid rice, and RCEF seeds aired 218 times via 5 partner-radio stations; 88 TV placements on RCEF aired; and 127 news/feature stories on regular DA-PhilRice rice R4D programs, hybrid rice, Golden Rice, and RCEF uploaded.

    PalayAralan
    - 24 PalayAralan livestreams on various rice production and management topics were aired in 2021 reaching 383,512 general audience.

    Community Relations
    - Basic rice education briefings and field tours for 850 visitors and clients from the academe, NGOs, and foreign visitors were conducted.

40. Training programs were continued by strengthening the online platform in addition to blended and face-to-face approaches.