BAGONG PILIPINAS

DEPARTMENT OF AGRICULTURE
1898
BUREAU OF AGRICULTURAL RESEARCH

Annual Report 2023

Strengthening access to research-based agriculture and fisheries technologies and innovation

about the cover

The cover represents a progressive agriculture and fisheries blending traditional methods to modern technologies. With the Department’s goal to transition to agriculture 4.0, the cover aims to communicate how our farmers and fishers have gradually incorporated these modern technologies into their day to day practices. These scenes highlight DA-BAR's commitment to advance research-based technologies for a sustainable future in agriculture and fisheries.

2023 DA-BAR Annual Report

Strengthening access to research-based agriculture and fisheries innovation and technologies

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CITATION

2023 DA-BAR Annual Report. (2024). *Strengthening access to research-based agriculture and fisheries innovation and technologies.* Department of Agriculture-Bureau of Agricultural Research: Diliman, Quezon City, Philippines.

ISSN 1655-3950

contents

abbreviations and acronyms used

AFACI	Asian Food and Agriculture Cooperation Initiative
ASEAN	Association of Southeast Asian Nations
ASF	African swine fever
ASFV	African swine fever virus
ATWGARD	ASEAN Technical Working Group on Agricultural Research and Development
ATBI	Agri-fisheries Technology Business Incubation
BAI	Bureau of Animal Industry
BAR	Bureau of Agricultural Research
BBTV	Banana bunchy top virus
BCFRA	Burgos Catfish and Rice Farmers Association
BFAR	Bureau of Fisheries and Aquatic Resources
BPI	Bureau of Plant Industry
CALABARZON	Cavite, Laguna, Batangas, Rizal, and Quezon
CGUARD	Corn Germplasm Utilization through Advanced Research and Development
CLSU	Central Luzon State University
CVLTBI	Cagayan Valley Legumes Technology Business Incubator
CVRC	Cagayan Valley Research Center
CvSU	Cavite State University
DA	Department of Agriculture
DepEd	Department of Education
DNA	Deoxyribonucleic acid
DOST	Department of Science and Technology
DSWD	Department of Social Welfare and Development
ECWO	Episcopal Church Women's Organization
e-IRM App	Electronic Insecticide Management Application
ELISA	Enzyme-linked immunoassay
FAW	Fall armyworm
FCA	Farmer cooperatives and associations
GrowApp	Seed Growers Mobile App
H5N1	Avian influenza
HVCDP	High Value Crops Development Program
IAS	Invasive aquatic species
IEC	Information, education and communication
IPB	Institute of Plant Breeding
IRRI	International Rice Research Institute
KMISD	Knowledge Management and Information Systems Division
LAMP	Loop-mediated isothermal amplification
LGU	Local government unit
LMDP	Low-cost Portable Molecular Diagnostic Platform
MBCR	Marginal benefit-cost ratio
MS	Master of Science
NCPC	National Crop Protection Center

abbreviations and acronyms used

NDV	Newcastle disease virus
NFRDI	National Fisheries Research and Development Institute
NIRAS	NIRAS Asia Manila Inc.
NOAP	National Organic Agriculture Program
OAW	Onion armyworm
PCR	Polymerase chain reaction
PCW	Philippine Commission on Women
PFVGMAL	Passion Fruit and Vegetable Grower Marketing Association of Lucban, Inc.
PhD	Doctor of Philosophy
PhilRice	Philippine Rice Research Institute
POT	Package of technology
PRIME	Pest Risk Identification and Management
PRRSV	Porcine reproductive and respiratory syndrome virus
PSAU	Pampanga State Agricultural University
QYEA	Quirino Young Entrepreneurs Association
R4D	Research for development
RIC	Rural Improvement Club
RNA	Ribonucleic acid
RSIS	Rice Seed Information System
S&T	Science and technology
SCALE-UP	Sustainable Community-based Action Research for Development and Extension for Livelihood Enhancement, Upliftment, and Prosperity
SEARCA	Southeast Asian Regional Center for Graduate Study and Research in Agriculture
SOCCSKSARGEN	South Cotabato, Cotabato, Sultan Kudarat, Sarangani, and General Santos
SSNM	Site Specific Nutrient Management
TiLV	Tilapia lake virus
UPLB	University of the Philippines Los Baños
UPLBFI	University of the Philippines Los Baños Foundation Inc.
WOS	Warehousing Online System
WSSV	White spot syndrome virus
YLP	Yamang Lupa Program
ZECC	Zero energy cooling chambers

director's message

Junel B. Soriano, PhD

Two words have defined this year for the bureau — **adaptive and innovative**.

With enhanced human resource capacity at the forefront of its priorities, the DA-BAR has listed accomplishments beyond its foresight. Strengthened regional networks, forged partnerships both locally and internationally, and a comprehensively crafted medium-term R4D agenda are among the noteworthy achievements that DA-BAR boasts for the year 2023; all the while ensuring that all its R4D outputs are accessed and utilized by its intended clientele.

Through its capacitated and empowered workforce, the bureau has reaffirmed that despite its ever-changing environment, one thing has remained constant—its commitment towards service delivery for the agri-fisheries sector, more especially for the farmers and fishers and its community. By employing adaptive strategies and exploring innovative mechanisms, DA–BAR has proven time and again that the path towards a modernized and self-sustained agri-fisheries sector is at hand.

Hence, the 2023 Annual Report of DA-BAR! This document encapsulates what has transpired in the bureau for the year and enumerates the particulars. A painstakingly packaged document, this annual report presents momentous feats that the bureau has undergone as well as notable accomplishments, reflecting significant achievements in the conduct of technology generation which the bureau supported.

As it is during the previous years since the bureau's establishment, these accomplishments would not have been realized if it were not for the collaborative efforts of its partner R4D institutions. To our long-time partners—DA regional field offices, state universities and colleges, civil service organizations, and the private sector who has likewise been long involved in various R4D undertakings—our sincerest gratitude for your time and dedication towards the improvement and upliftment of the agri-fisheries sector. Your relentless efforts and unwavering commitment has always provided us with extra sets of lenses that allow us to view the sector from different standpoints.

To our farmers and fishers, to whom we owe and dedicate the harvest of our labor—our heartfelt appreciation to your openness and adaptability towards change that has pushed for a progressive agri-fisheries community. Your collaborative minds and adaptive spirits serve as the driving force that unifies all our hardwork into one, strong foundation where a food secure Philippine economy will emanate.

FY 2023 financial overview

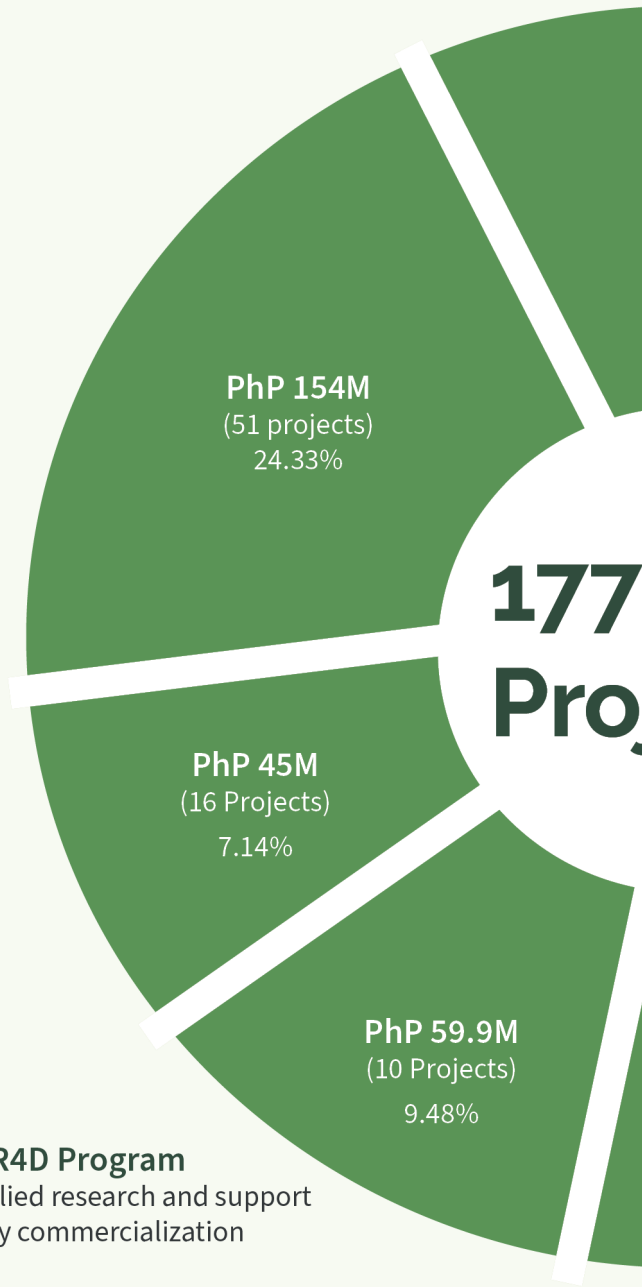
PhP 824,007, 683.89

Total amount received from 2023 General Appropriations Act
in support to the bureau's operation, and programs, activities, and projects

Personnel Services + Overhead PhP 171,463,251.76
Programs PhP 652,544,432.13

Program Fund Distribution (in PhP)

Alloted Obligated Disbursed



AFMA Various R4D Program

includes alloted funds under DA-BAR's AFMA Funds for RFDG Livestock and poultry fisheries and aquaculture, climate change R4D policy researches, and scholarship grant.

160,565,054.75
160,565,054.75
153,937647.00

National Organic Agriculture R4D Program

Includes basic and applied researches, organic agriculture-based researches, research facilities and equipment, and related IEC materials

46,000,000.00
45,170,748.56
45,170,748.56

Livestock R4D Program

Includes applied research and support to technology commercialization projects

60,000,000.00
59,999,999.00
59,999,999.00

obligations

PhP 806,510,295.53

Incurred and commited to be paid by the bureau from the total fund allotment

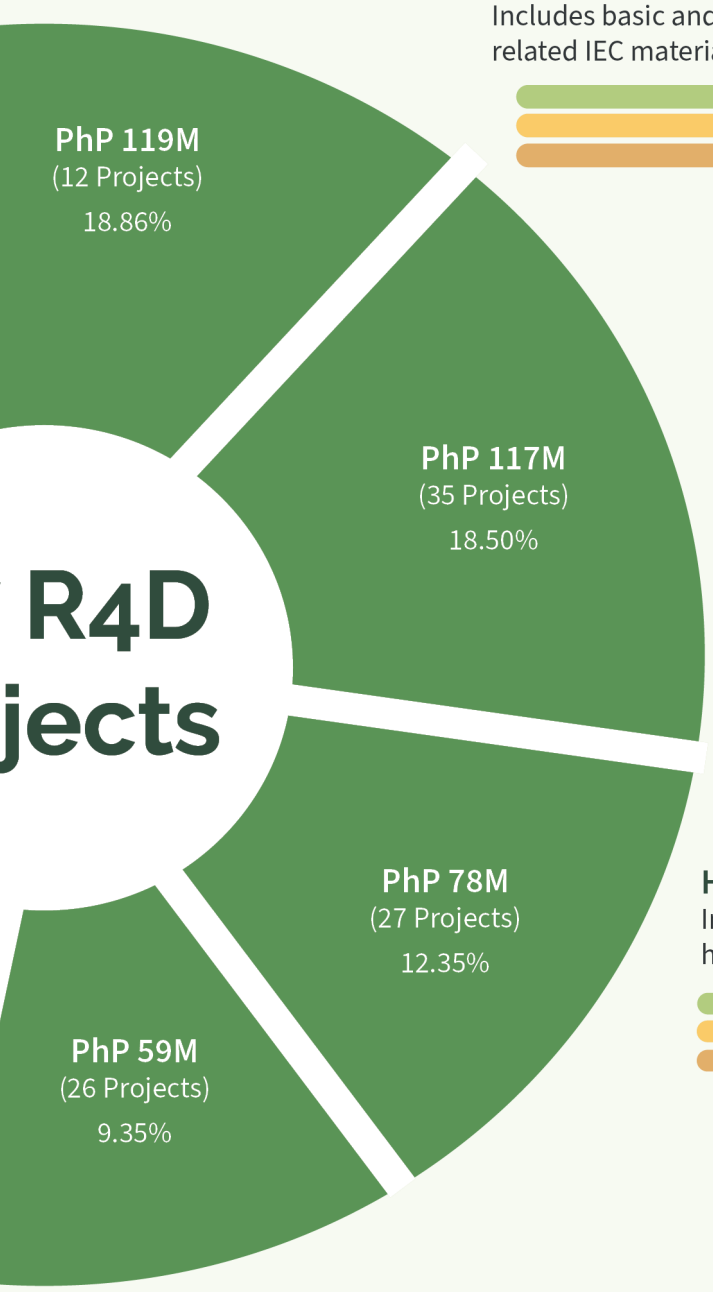
Personnel Services + Overhead PhP 154,795,116.84
Programs PhP 651,715,178.69

disbursed

PhP 780,038,498.94

released by the bureau as payment for obligated fund allotment

Personnel Services + Overhead PhP 147,235,779.33
Programs PhP 632,802,719.61



National Rice R4D Program

Includes basic and applied researches, related IEC materials and activities

125,419,000.00
125,418,999.00
119,327,662.54

Biotechnology R4D Program

Includes alloted funds under DA-BAR's AFMA funds for basic researches on Biotechnology

122,120,377.38
122,120,377.38
117,091,724.23

High Value Crops R4D Program

Includes basic and applied researches and high value crops-based researches

78,440,000.00
78,440,000.00
78,128,385.20

National Corn R4D Program

Includes corn, cassava, and sorghum basic and applied researches

60,000,000.00
60,000,000.00
59,146,553.08

featured technologies

Commodity

- National Rice Program
- National Corn Program
- High Value Crops Development Program
- National Livestock Program
- Aquaculture and Fisheries Program

Thematic

- National Organic Agriculture Program
- Climate Change R4D Program
- DA-Biotechnology Program
- Scaling R4D

commodity program

National Rice Program

Geared toward enhancing the resiliency and competitiveness of Filipino rice farmers while ensuring the country's access to safe and nutritious rice, the DA-National Rice Program is among the banner programs of the DA.

Aligned with the Masagana Rice Industry Development Program four core strategies: MAtatag (climate change adaptation or resiliency), SAma-sama (clustering and consolidation of farms), GAnado (motivated farmers in the rice value chain), and NApapanahon (digital transformation to improve farming practices and program implementation), the NRP prioritizes the development and introduction of improved and state-of-the-art farming technologies and innovations on rice and rice-based farming systems.

The DA-BAR leads the strategic management and coordination of various rice R4D programs, activities, and projects. Implementing these R4D initiatives are DA national and regional offices, state universities and colleges, and other research institutions.

featured technologies

under National Rice Program

Pest Risk Identification and Management

As the lead for research and development agency of the department, the DA-BAR funded the Transition and Sustainability of the PRIME project for two years, starting in 2020. Implemented by the DA-BPI in collaboration with the IRRI and the DA-PhilRice, the project aims to ensure sustainability within the DA by identifying needed mechanisms for transitioning PRIME from research to operation.

As a result of a series of consultations with technical experts and Regional implementers, the project developed a sustainability plan that serves as a guide in the institutionalization of PRIME within the DA. In addition, PRIME has developed an operations manual which contains all the protocols developed during the developmental stage of the project. This will guide all implementers on the standard protocols and procedures PRIME had developed.

Through PRIME, the DA-BPI-Crop Pest Management Division and DA-RFO-Rice Crop Protection Center provide current pest status through the daily alerts and monthly pest bulletins, and pre-semester bulletins as early information for pests that might occur for the coming cropping season including management recommendations for these pests.

PRIME has been identified as one of the technologies to be scaled out by the DA-IRRI Task Force on Scaling Rice Technologies, through enhanced surveillance component, analysis of remote-sensing data, extended coordination to the barangay level, identification of pest and disease hot spots and formulate mitigation measures, among others.

The project's target beneficiaries or next end-users are the DA, DA-BPI, DA-PhilRice, DA regional field offices, farmers, and rice consumers.

Improving the rice seed industry through Rice Seed Information System

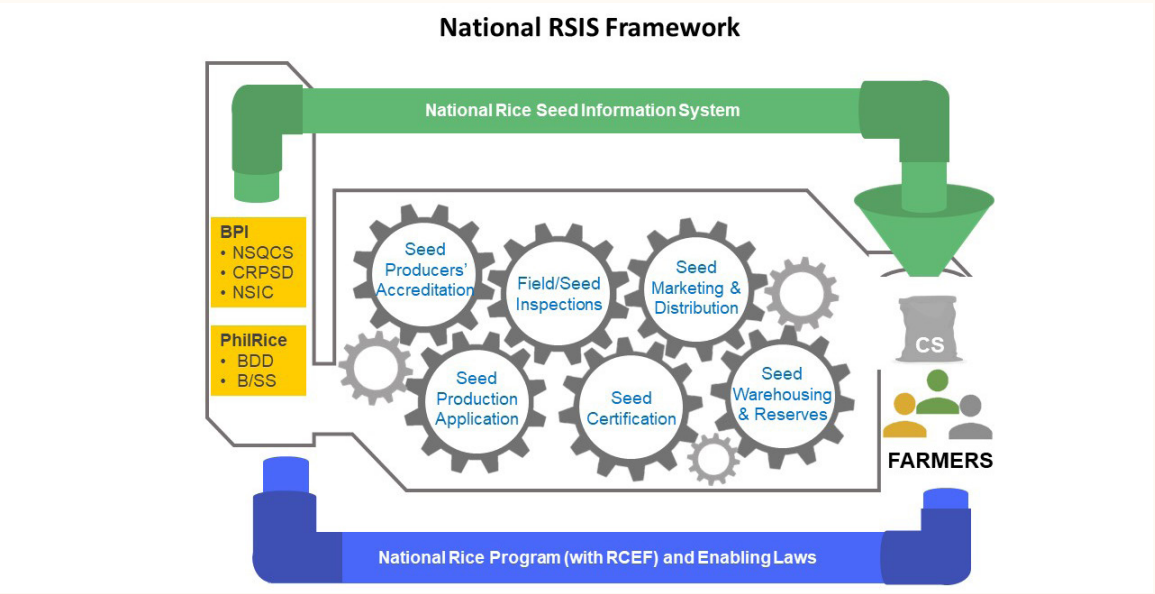
Data from the ground especially when gathered and consolidated manually is quite difficult and slow. Much so that when these data are transmitted to authorities, updating is needed again, making this a recurring scenario. Given that this is a problem, a system called the RSIS was initiated.

RSIS was developed to help improve the rice seed industry and cope with the fast-paced technological change toward digitization and digitalization. The DA-PhilRice and DA-BPI, with funding from the DA-BAR, collaborated to develop and deploy the RSIS.

RSIS is an online, offline, and web-based platform for collecting, consolidating, and disaggregating data. It is a near real-time rice seed production and distribution data at the municipal, provincial, and national levels for sound decision-making of policymakers and key agencies.

Both the DA-PhilRice and DA-BPI have developed six modules and apps each to make up the system. The DA-PhilRice developed the Planting-Production Planning, Production, Postharvest, Warehousing Online System (WOS automatically transmits daily seed inventory), and Seed Ordering System via Kiosk (connects with the WOS for seed release) for its Central Experiment Station and branch stations use, and the Seed Growers Mobile App (GrowApp). This GrowApp links with the seed growers in a digital application for seed certification to DA-BPI National Seed Quality Control Services. The DA-BPI developed another six modules and apps such as Seed Inspector's Mobile App, Databank Web App, Seed Growers Web Portal, Seed Planner and Monitoring Web App, and Seed Reserve Web App for seed inspectors, growers, and coordinators and for DA-BPI personnel particularly in seed certification processes in the laboratory.

The deployment of the RSIS has already started in Central Luzon and it is doable. The results of the recent testing of the system show its effectiveness. The RSIS modules and apps have brought many insights and developments along the rice seed value chain after being piloted in the region. It is ready for scaling up or to be deployed in the major rice-producing provinces if not nationwide in 2-3 years.



commodity program

National Corn Program

In the Philippines, corn or maize (*Zea mays*) is next to rice as the most important crop, hence the creation of its own banner program under DA. White corn is grown for food, while yellow corn is mainly used for animal feed. Likewise, in view of their importance in the production of food and animal feeds, cassava, soybean, and sorghum became under the umbrella of the National Corn Program.

The program aims to transform farmers cultivating corn, cassava, soybean, and sorghum to productive, competitive, resilient, and profitable agripreneurs by providing science-based interventions and support services.

The DA-BAR is continuously coordinating and providing support to partner R4D institutions and stakeholders in generating appropriate technologies on varietal development and improvement, soil and nutrient management, integrated pest management, crop-based farming systems, mechanization, digitalization, and product and market development to ensure a productive and profitable industry.

featured technologies

under National Corn Program

Safeguarding and improving native corn varieties in the Philippines

The CGUARD program, led by the UPLB-IPB, together with the DA-BPI and DA regional field offices, continues its initiative to preserve and develop the native corn varieties of the Philippines.

Through the program, native corn varieties are collected and screened for varietal improvement. To date, CGUARD has achieved significant results, including the identification of traditional corn varieties with high yield and resistance to Asian corn borer, Fusarium ear rot, downy mildew, and tolerance to drought and waterlogging.
The program has already collected and conserved 4,373 corn accessions for varietal improvement.

In a recent launch event held on 5 December 2023, CVRC Glut 21-16 of DA-CVRC commonly referred to as Deko, and Tupi 1 WIT (White Improved Tiniguib), developed by DA-SOCCSKSARGEN were distributed to farmers. The CVRC Glut 21-16, commonly known as Deko, is an early-maturing glutinous corn variety with an average yield of 4-6 mt/ha. It also has a good husk cover, making it resistant to many pests and diseases. While, DA-SOCCSKSARGEN's Tupi 1 WIT, a white flint corn, showcases an average yield of 5.16 mt/ha. This surpasses another check variety from Mindanao, which achieves approximately 4.98 mt/ha. It also exhibits a shelling recovery rate of 79%, 22-24 kernel rows, and apparent tolerance to downy mildew disease.

Farming cassava in the digital age

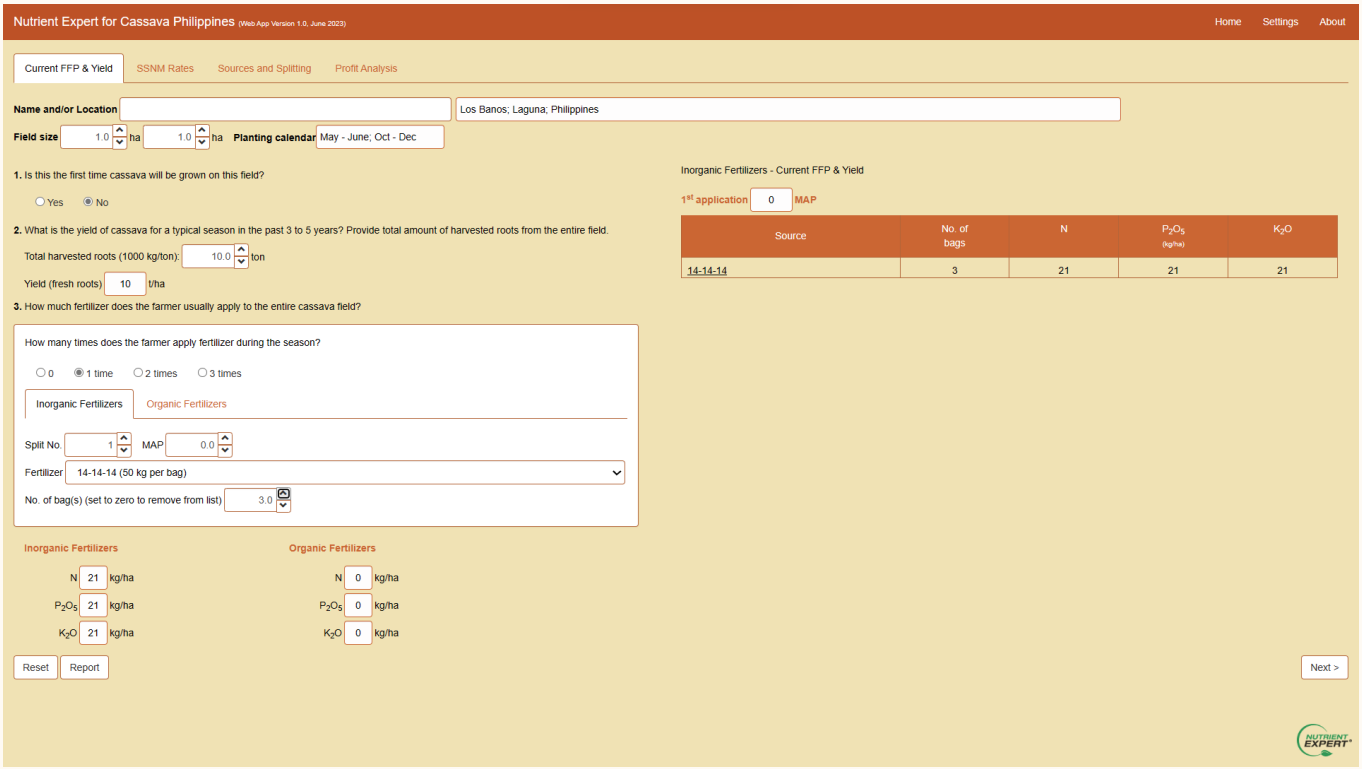
The Nutrient Expert software for cassava has been released for adoption by farmers, private sectors, and other interested practitioners.

The software utilizes the principles of site-specific nutrient management, enabling users to develop fertilizer recommendations tailored to a specific field or growing environment. This innovative tool provides farmers with the knowledge to determine the optimal type and quantity of fertilizer for their crops, the ideal planting locations for cassava, and the appropriate timing for fertilizing cassava crops. By leveraging this software, farmers can make informed decisions that would enhance crop yield and overall agricultural efficiency.

Recent trials employing Site Specific Nutrient Management technology in Eastern Visayas, SOCCSKSARGEN, and Caraga revealed that the software has potential to boost yields by 5.94-16.61 tons per hectare compared to traditional farmer fertilization practices. Furthermore, it can enhance production by 8.37-38.63 tons per hectare compared to fields left unfertilized.

This validation was further supported by the trial conducted in UPLB-IPB wherein Lakan cultivar in all trials were able to hit the targeted yield and even surpassed it. While other cultivars did not attain the targeted yield, the yield still surpassed that of the farmers' fertilizer practice and the control. Thus, demonstrating the capability of the software to increase cassava yield as shown in the trial sites.

The Nutrient Expert software is also available for corn.



featured technologies

under National Corn Program

Early warning system for corn and cassava arthropods, pests, and diseases

Corn and Cassava farmers in the Philippines can expect increased yields, courtesy of an early warning system developed by the DA-BPI. The system is designed to effectively monitor and address issues related to cassava arthropods, pests, and diseases that significantly impact crop yield and quality.

The project utilizes modern technology, particularly the Open Data Kit, to conduct surveys and gather data. It is an open-source mobile application capable of facilitating efficient and systematic gathering of information in the field. Utilizing the application, users can conduct surveys and gather real-time data on cassava arthropods, pests, and diseases sourced from the established national database by only using their smartphones.

The project includes timely alerts for farmers, providing them with information to foresee and address potential pest issues in their region. The application will send notifications specifying the type and name of pests affecting a particular area, along with details about symptoms and recommendations for pest management.

In January 2020, DA-Cagayan Valley and DA-Northern Mindanao were selected to establish data on the incidence and severity of corn and cassava arthropods, pests, and diseases. Monitoring sites were established based on elevation and fertilizer rate in Isabela, Quirino, Bukidnon, and Misamis Oriental. The results indicate that red spider mites, cutworms, whiteflies, and mealybugs are the most dominant pests in both regions, while brown leaf spot, cassava phytoplasma disease, and bacterial blight are among the leading diseases.

commodity program

High Value Crops Development Program

The HVCDP is one of the banner programs of the DA created through Republic Act No. 7900 or the High Value Crops Development Act of 1995. It aims to deliver appropriate services, promote access to local and international markets, and ensure proactive management actions on the demand and supply situation. The program is mandated to contribute to the attainment of food self-sufficiency, economic growth, and enhancement of consumer's health and welfare.

Through the support and guidance of the HVCDP, DA-BAR leads the strategic management, coordination, and development of breakthroughs in high value crops research for development programs and activities. The bureau coordinates with DA national and regional offices, state universities and colleges, and other research institutions in developing and promoting packages of technologies for various priority high value crop commodities.

featured technologies

under High Value Crops Development Program

Developing postharvest storages

Mobile solar-based precooler

To minimize postharvest losses and extend the shelf life of highly perishable high value crops, the UPLB fabricated a one-ton mobile solar-powered precooler prototype. Precooling is the process of removing the field heat (or the difference between the temperature of the crop when harvested and its optimal storage temperature) immediately after harvest. The faster this is executed the greater the chance that the crop reaches the consumer at its maximum quality.

The prototype is a polyurethane-insulated walk-in chamber mounted on a trailer that can carry 3.5 t gross weight. Tests showed that the prototype precooled selected high value crops, at partial capacity, in 2-4 hours with weight loss of not more than 2%. With the 2-hp refrigeration system installed, the temperature inside decreased to 10-15°C. The prototype is powered by a solar photovoltaic system with a hybrid off-grid setup with the battery bank as the main power output source charged by solar panels or by utility grid. Results also showed that the fabrication cost of PhP 1,271,683.49 is more than PhP 500,000 cheaper than acquiring a brand new refrigerated truck.

The mobile precooler can serve as an alternative cold storage when not in use, especially in remote areas. UPLB will further optimize the prototype as a cold chain facility from precooling to storage and transport of high value perishable crops.

Zero energy cooling chambers

The DA-Cagayan Valley developed and tested four ZECCs to provide vegetable farmers in the region with a cheaper alternative to mechanical refrigeration. ZECC is an evaporative cooling system that works akin to how our bodies cool down through perspiration. When water is poured over the walling, the cavity materials absorb the moisture and in time evaporates, resulting in a high relative humidity and lower temperature than outside the chamber.

On-station trials revealed that ZECC using charcoal walling extended the shelf life of hot water treated tomatoes to 31 days with fruit weight remaining at 868 kg per ton. This resulted in higher benefit income of PhP 20,822.50 and marginal benefit-cost ratio of 7.26%. While untreated tomatoes stored in the same chamber after 31 days had an additional treatment cost of PhP 585.5 with higher net benefit income among other chambers at PhP 19,339.50 and higher MBCR of 9.14% per ton.

Further, ZECC using double brick wall with river sand and zeolite had the highest fruit weight for hot water treated eggplants after nine days retained the highest fruit weight with additional treatment cost of PhP 1,159.56 and equivalent net income of PhP 19,740.44 or 2.29% MBCR. For the untreated eggplants, ZECC using double brick walling and river sand gave the highest MBCR of 1.71% with net benefit income of PhP 17,252.89.

Among the cavity materials used, the charcoal walling provided the highest mean of fruit weight but is comparable to the results of double brick walling with river sand and zeolite. The former increased the shelf life and maintained the quality of the tomatoes until 31 days. While for eggplants, the results for the charcoal walling, double brick walling with river sand, and double brick walling with river sand and zeolite produced comparable results in terms of fruit weight.

Among all these, DA-Cagayan Valley recommended the ZECC using charcoal walling as its construction cost is cheaper than the other two setups. This will be subjected to on-farm trials for the second phase of the project.

featured technologies

under High Value Crops Development Program

Utilizing ICT to manage pests

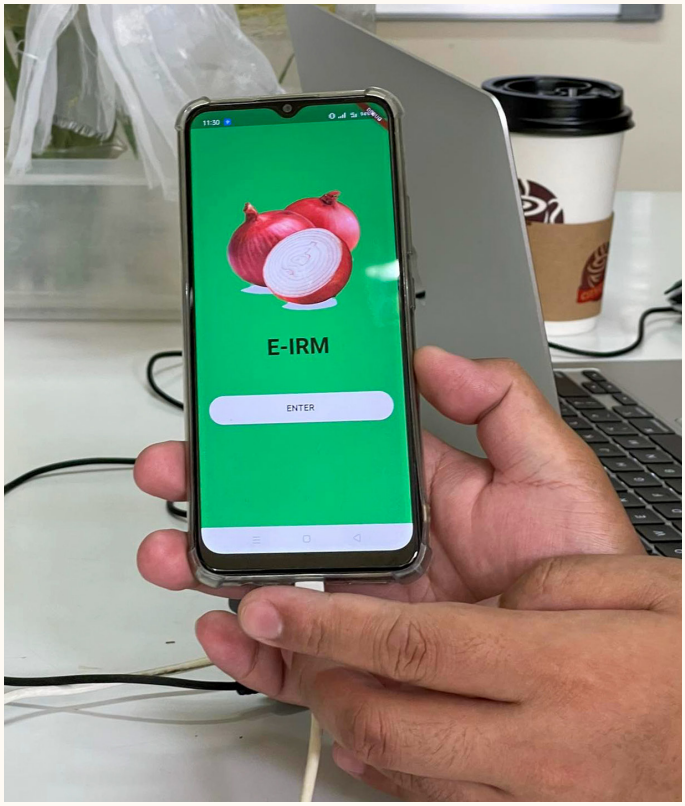
The UPLB-NCPC developed a mobile application that will provide farmers easy access to site-specific integrated pest management recommendations to manage pests, as well as delay and avoid the occurrence of insecticide resistance. Soft launched on 15 December 2022 at the NCPC Auditorium, the e-IRM App can be used with or without internet connection.

The app was built using Flutter, open-source user interface software development kit created by Google, allowing the developers to reach wider compatibility across different target devices. With this, the e-IRM App can be downloaded from the Google Play Store and App Store.

The app has three key features: Calendar, Map, and Learn. This will generate an insecticide rotation calendar based on the Mode of Action classification scheme tailored to the cropping season, susceptibility of insects, availability of insecticides, historical insecticide usage, and weather information in an area.

Baseline information found in the e-IRM App were gathered from the existing database of the NCPC, extensive surveys conducted in eight provinces across the country, and bioassays and analysis of insecticide resistance mechanisms of fall armyworm through molecular tools. Meanwhile, the recommendations generated by the app were validated in corn sites in Laguna and Pampanga.

Further improvements as well as information on insecticide resistance management for onion armyworm will be incorporated in the updates of the app.



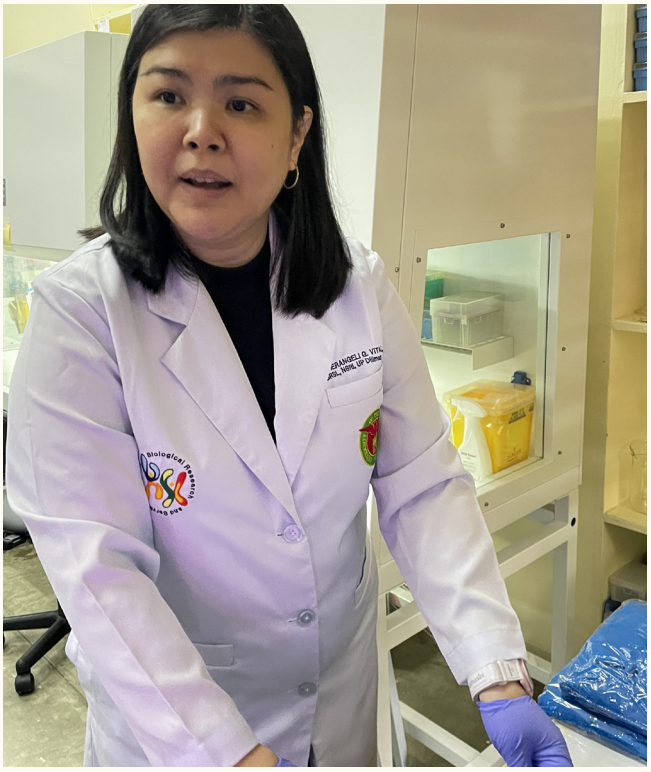
Microbial source tracking of *E. coli* contamination in fresh produce

The fecal indicator bacterium *Escherichia coli* is one of the leading causes of foodborne disease in the Philippines and its presence has been detected in crops, especially vegetables. To help address this food safety concern, the Biological Research and Services Laboratory, Natural Sciences Research Institute, University of the Philippines Diliman surveyed the presence of thermotolerant *E. coli* in 419 vegetable samples in three urban farms and four major wet markets in Metro Manila during the peak of the COVID-19 pandemic in February 2021 to March 2022.

Using molecular and culture techniques, *E. coli* was found in 13.60% of all samples obtained. There was a higher prevalence of *E. coli* contamination in urban garden samples compared to the wet market ones. However, the correlation between the fecal coliform contamination and season, other climatic variables, and physicochemical parameters of irrigation water was inconclusive. There was no significant difference in *E. coli* contamination between the wet and dry season which means that contamination may occur at any point in time..

Five microbial source tracking gene markers were detected among the *E. coli* isolates from urban farms. The most predominant source of contamination was from avian, while other sources included human, cattle, and dog. No sample turned out positive for swine.

Results of the project were used as one of the bases in the development of the Philippine National Standard on General Standards for Microbial Hazard Limits in Primary and Postharvest Food and Feed-Product Standard.



commodity program

DA-National Livestock Program

Under the DA-National Livestock Program, the DA-BAR prioritized research initiatives that cover areas such as animal disease management and diagnostics; animal nutrition; animal breeding, selection and genetics; animal production; and product development and by-product utilization.

featured technologies

under DA-National Livestock Program

Sustainable breeder farms for Philippine native chicken

To develop sustainable breeder farms for native chicken meat and egg production, the DA-BAI employed the pyramid breeding structure and breeding scheme wherein the nucleus farm continuously improves the pure lines. The multiplier farms then breed and multiply parental stocks or crosses to supply the needs of commercial and backyard farms.

Three pure line breeds Paraoakan, Banaba, and Joloano underwent various crossbreeding trials to determine the best combination. A total of 3,034 native chicken hatching eggs were incubated and used as foundation stocks. These were subjected to growing and laying performance tests. Pure line Banaba was identified as ideal to be used for egg production, while Paraoakan and Joloano were ideal for meat production. Crossbreeding among the pure line of the said native chicken breeds will improve meat and egg production.

Cost and return analysis showed that annual gross income for a nucleus farm was PhP 1,807,000 with total variable and fixed cost at PhP 1,159,022.40. Net income was PhP 647,977.60 with rate of return to capital of 187.39%. While for a multiplier farm, annual gross was PhP 1,084,200 with total variable cost at PhP 549,551. Net income was PhP 543,648.54 with rate of return to capital of 302.75%.

Investigating immunological characteristics and microbiome composition of native chickens

The UPLB collaborated with various institutions from the United Kingdom and Thailand to investigate in detail the immunological characteristics and microbiome composition of native chickens. The research team used ELISA and real-time PCR to analyze the immune response of chickens over a period of five months. DNA sequencing was used to study the microbiome composition of the chicken gut, as well as the antibiotic resistance genes present.

Microbiome profiling showed that probiotic bacteria Lactobacilli and Bacteroides profilerated the gut of Paraoakan x Banaba breed. Although further studies are needed to explore its potential as probiotics.

Antibiotic resistance genes against various antibiotics such as tetracyclines, phenicols, macrolides, and beta lactams were detected. Culturable Salmonella and Campylobacter were also found.

Bacterial culture and metagenetic DNA sequence analysis of swabs and ileal and cecal contents confirmed the presence of enteric pathogens in the gut of native chickens such as *Salmonella sp.*, *Campylobacter jejuni*, and *Campylobacter coli*. Data analysis detected the presence of *Enterococci taxa*, as well as Escherichia-Shigella bacteria in the chickens which was concurrent with biochemical identification tests of some isolates.

Raw sequencing work for the genomes of Boholano, Darag, Paraoakan, Banaba, and Paraoakan x Banaba was also done and its DNA sequence data stored at the Philippine Genome Center and the Roslin Institute.

featured technologies

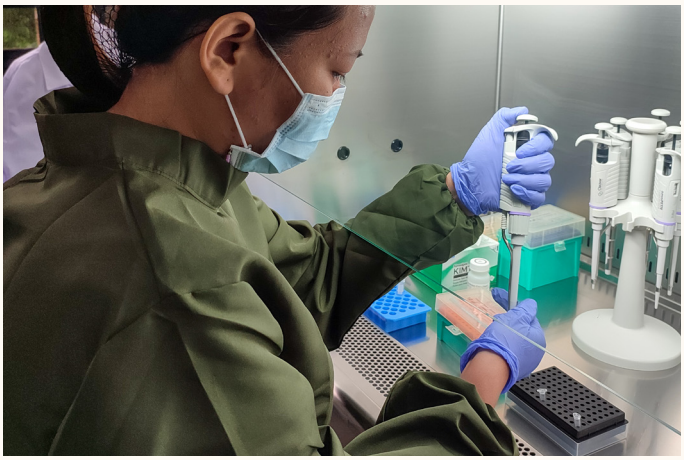
under DA-National Livestock Program

Generating baseline information for improved diagnosis of various livestock viral diseases

Optimized DNA analysis for accurate diagnosis of emerging deadly viruses

To efficiently diagnose the presence of emerging deadly viruses of swine, poultry, tilapia, and shrimps, the Pampanga State Agricultural University optimized the existing technologies of DNA analysis using biotechnology applications.

DNA was extracted from ASFV and WSSV, while RNA was extracted from NDV, H5N6, and TiLV. The DNA samples were run in PCR protocol following the prescribed primers and probes, as well as thermal cycling conditions from World Organization for Animal Health and DA-BAI-Central Luzon. Meanwhile, RNA samples underwent RT-PCR.



Results showed that there was low occurrence of ASFV among public markets in Pampanga, Bulacan, Tarlac, and Nueva Ecija. Sampling was done during the implementation of DA-led initiatives to control spread of ASFV. WSSV was only found in Masantol, Pampanga. Avian influenza, specifically H5N1 clade 2.3.4.4, was detected in Central Luzon. There were no TiLV and NDV among the samples gathered.

Further, information generated through this research will be used to formulate policy in coordination with DA, DA-BAI, and DA-BFAR.

Developing strategic approach to identify and combat PRRSV

To develop an affordable option for screening and confirmatory diagnosis of PRRSV and other porcine viral diseases, the CLSU in collaboration with the Roslin Institute of the University of Edinburgh optimized the nucleic acid-based assays designed for Philippine-isolates. These assays were in the form of PCR, LAMP, and Recombinase Polymerase Amplification.

Results showed that poor awareness on the significance of biosecurity and its noncompliance in smallhold farms were culprits for transmission. The study identified that there is a need to: 1) update the data on the prevalence of swine viral diseases in the country, and 2) determine the sequence of the target gene of Philippine field isolates and the vaccinal viruses from modified live vaccines.

Through the project, a method and test kit for detecting ASF was developed and is pending for patent. Further, the optimized laboratory workflows of nucleic acid-based rapid test assays of different respiratory and gastrointestinal viral infections that specifically detect Philippine isolates are ready for assemblage into field-ready test kits in future studies. CLSU will also be developing a policy brief on preventing and controlling respiratory and gastrointestinal swine viral infections.

commodity program

Aquaculture and Fisheries Program

The Philippines is one of the top fish producing countries in the world thus highlighting the important role of the aquaculture and fisheries sector in ensuring food security and reducing poverty of the population. It plays a significant contribution to the economy as source of food, livelihood, and employment.

The Aquaculture and Fisheries R4D program prioritizes demand-driven and outcome-based R4D initiatives that seek to develop knowledge, tools, models, or other products that bring about needed changes and improvements to the fisheries sector.

Consistent to and supportive of national priorities and programs, the program likewise considers cross-cutting concerns, such as, climate change; gender and development; biotechnology; organic aquaculture; inclusivity; infrastructure; and mechanization.

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under Aquaculture and Fisheries Program

Site-specific protocols for red tilapia production established in Luzon

Studies have shown that different environmental factors and culture systems have significantly affect the growth, survival, and production of red tilapia (*Oreochromis niloticus* x *Oreochromis mossambicus*). The environmental differences also influence and determine the maximum size of the fish.

The great need to increase the aquaculture production to sustain the supply of fresh produce for the country's growing population and with the promising aquaculture gains on red tilapia, the Bureau of Fisheries and Aquatic Resources-Luzon cluster, particularly the Ilocos, Cagayan Valley, Central Luzon, and the Bicol Regions, including the Cordillera Administrative Regions, evaluated and established the production technologies of the red tilapia in ponds and cages in their regions. The established technology on red tilapia culture also generated livelihood opportunities to augment fisherfolks income involved in red tilapia production and food preparation or in processing.

Ilocos region
A total of 875.48 kg of red tilapia were partially harvested in the San Nicolas, Ilocos Norte site while 298.2 kg in Alaminos Pangasinan site. The produce was used in the cooking demonstration during the festival, and distributed to fisherfolk project-partners.

Four harvest festivals were held separately and showcased various red tilapia recipes demonstrated by BFAR-assisted women's RIC. The festival raised awareness of red tilapia as high-value fish commodity to local stakeholders in the community including fish farmers, government officials and other key players in the aquaculture industry.

The festivals were organized to celebrate the bountiful harvest of red tilapia and showcased the many benefits and advantages of red tilapia farming. Produced and distributed are Information, Education, and Communication materials that provide relevant information on the culture production and various ways of food preparations to enjoy the delicious and nutritious products of red tilapia.

Cagayan Valley region
Stocking density of five pcs/sqm red tilapia cultured in ponds yielded the best results in terms of growth performance and survival rate, highest mean production, and highest economic returns. Meanwhile, in cage culture of red tilapia, stocking density of 25 pieces/cu m revealed overall good growth of red tilapia in brackishwater cages in terms of mean body weight, standard length, and body depth.

To further promote red tilapia as new culture commodity and as raw material in food preparation, a training on red tilapia utilization and cooking contest were conducted. A recipe book on red tilapia was also published.

And to sustain the production of red tilapia in the market and to address the demand of fisherfolk on the availability of red tilapia fingerlings, the Local Government Unit-Abulug, Cagayan; Cagayan Valley Aquaculture Producers Cooperative; and FDN Integrated Farm, ensured the source and production of red tilapia in Cagayan Valley.

Central Luzon region
Results of the study showed 80% survival after five-month culture producing a total of 1,656.9 kg red tilapia for both freshwater and marine cages. The red tilapia reared in freshwater with a stocking density of 35 pcs/sqm had the fastest growth rate. However, the average final weight reared in marine cages was observed to be heaviest at 320 grams.

Fourteen fish farmer adoptors and other fisherfolk organizations, Provincial/Municipal Local Government Units, State Universities and Colleges, researchers, and other stakeholders in Central Luzon underwent training on red tilapia grow-out culture protocols. Various IEC materials were also developed like brochures, posters, and fans to create awareness of red tilapia and its culture and production, and distributed to fisherfolks and different municipalities in Central Luzon.

A field day/harvest festival and post-harvest training were conducted in two sites (freshwater and marine sites) and included activities such as lectures, presentations, open forums, and cage visitation. A separate capacity-building activity on fish processing was also conducted producing four products: bottled red tilapia in corn oil, dried red tilapia, fishballs, and marinated red tilapia.

Bicol region
Improved growth, survival, and production of red tilapia with an optimum stocking of 5 fish per square meter and survival rate of 80% with 4-5 fish per kilo. In the five-month culture period, the fish gained an average weight of 65.2 grams.

Both brackishwater pond culture [with Net Income (NI) equivalent to PhP 99,343 and ROI of 77%] and freshwater cage culture [with NI of PhP 23,290/cage and ROI of 24%] of red tilapia are economically viable even at the highest stocking densities.

More than 170 participants attended the training on red tilapia grow out culture technologies, on-site field days, and distribution of IEC materials to various stakeholders on production and product development like recipes for cooking red tilapia such as smoked red tilapia, isdanera, crispy fish burger, fish quekiam, fish wonton, fish siomai, tapang red tilapia, fish balls, and fish lumpia.

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Cordillera Administrative Region
Production of red tilapia in freshwater ponds totaled to 1,113.95 kg at five-month culture period and stocking rate of 5-8 red tilapia per square meter with positive ROI. However, slow growth was observed during the cold month of November to mid-March where temperature ranges from 14 to 24°C. Therefore, production of red tilapia is more suitable during hotter or summer months.

Meanwhile, production in freshwater cages totaled to 3,193.50 kg. Red tilapia can reach its optimum production in five-month culture in fish cages using stocking rate of 25 pieces per cubic meter. Survival of the red tilapia is higher in treatments with lower stocking rates in fish cages.

Owners of three established red tilapia hatcheries were trained in tilapia hatchery management through the DA-BFAR-CAR-Rizal Lowland Fish Farm, a technology outreach station. At the same time, members of two partner organizations, the Mountain Province Fisherfolk and Loach Throng and Banga-an RIC, have started the grow-out culture of red tilapia in their own farms.

Further, six fisherfolk in Sagada, Mountain Province have been assisted in the procurement of red tilapia fingerlings for their grow-out culture. Four red tilapia technology demonstration farms were also established in Apayao, Ifugao, and Benguet. These adopters of the hatchery and grow-out production of red tilapia will be continuously monitored by the bureau in coordination with the Provincial Fishery Offices.

One of the major problems facing milkfish farm operators is the limited number of hatchery and nursery farms where quality milkfish fry and fingerlings are sourced to stock their grow out farms. To contribute to this need, the DA-NFRDI engaged village-level cluster of milkfish farms in the province of Central Luzon and Cagayan Valley.

Improved milkfish hatchery and nursery protocols in Central Luzon

To address this limitation, village-level cluster of milkfish farms in the province of Zambales were engaged. In collaboration with DA-BFAR-Central Luzon and LGU of Iba and Palauig, Zambales, one hatchery and two nursery farms were selected as partner-cooperators and were provided with agricultural inputs for operation and upgraded their production and service facilities such as larval tanks and nursery ponds to increase fry and fingerling production.

Through trainings, partner-cooperators followed the established Southeast Asian Fisheries Development Center's POT on milkfish hatchery and nursery operations. Cooperators learned new practices, such as proper pond preparation, growth of natural food and feeding with commercial diets to maximize stocking density in the rearing ponds.

Hatchery farm operators also followed the POT on natural food production of rotifer which they use to feed and maintain quality fry. The use of algal paste as substitute for live *Nannochloropsis* as food to rotifers and milkfish fry was also tried.

A total of 155,500 fry in six cycles per year and 1,381,000 fingerlings in five cycles per year were produced, thus, augmenting the supply of quality fry and fingerlings. The seedstocks were sold to the nearby grow-out farms in Masinloc, Palauig, Infanta, Pangasinan, and Bulacan.

This contributed to a sustainable food supply for the community as well as for trade to nearby provinces. Furthermore, locally produced seed stock assured better survival of fingerlings due to reduced transport time, hence, resulting to better productivity and income for the fish farmers.

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under Aquaculture and Fisheries Program

Improved milkfish nursery protocols in Cagayan Valley Region

Highlighting its objective to ensure sustainable quality seed stock of milkfish by engaging village level nurseries in increasing fish production through adoption of relevant mature technologies, four village partner-cooperators from Sta. Teresita, Gonzaga and Sanchez Mira, Cagayan were selected and validated.

Partner-cooperators underwent trainings that would improve production and survival rate of milkfish fry to fingerlings in nursery ponds, like pond preparation and proper stocking density of fry, feeding management (use of rice bran for supplemental feeding), monitoring and record keeping, harvesting and size-grading of milkfish fry/fingerlings as well as counting, and packing and transporting fry/fingerlings.

They were provided with a POT that include fry from selected partners-private hatcheries, agricultural chemicals and supplies, and other supplies that are essential to the implementation of a nursery project.

In each site, 200,000 quality milkfish fry were distributed. After 60-day rearing period, survival rate is at 60% with 120,000 fingerlings per cycle produced or 360,000 fingerlings in three cycles per year.

Thirteen linkages were established for nursery farmers to grow-out farms and six municipality linkages were established for grow-out farms to market.

Linkages were crucial to ensure that fingerlings produced from the nursery farms will be sold and earn profit. Linkages established for the four project sites were from the municipalities of Santa Teresita, Abulug, Claveria, Gonzaga, Sanchez Mira, and Buguey.

To ensure sustainability of village-level milkfish nursery operations, a sustainable milkfish broodstock management program should be established to ensure a reliable supply of high-quality milkfish eggs for the nurseries.

Village level pilot hatchery of African catfish

Aimed to ensure a sustainable production of African catfish fingerlings at a village-level pilot hatchery, the NFRDI in collaboration with BFAR-National Freshwater Technology Center, engaged the BCRFA as cooperator.

The BCRFA adopted three POTs: 1) induced spawning using extracted pituitary glands from sacrificed male breeders were used as the inducing hormones injected to female breeders, where 90-100% spawning rate was observed; 2) larval rearing through sorting every day-7 and day-14 to ensure quality African catfish fingerlings produced are increased from 20% to 70%; 3) feeding procedures particularly on the propagation of natural food, *Moina sp.*, was also introduced.

The association were capacitated through continuous technical assistance, trainings, rehabilitation of hatchery, and provision of agricultural inputs for high quality and quantity of African catfish fingerling production.

An overall production of 263,500 pieces of more or less 1-inch African catfish fingerlings for three weeks in a 12 sqm rehabilitated nursery, with a survival rate of 70% to 80% from a 10% initial survival rate. The high survival rate resulted to high fingerling production rendering an annual net income of PhP 180,592.70, gaining 242.71% of the investment.

Eleven grow out cooperators from Ilocos, Cagayan Valley, and Cordillera Administrative regions benefitted by the hatchery's production where 50,000 pieces African catfish fingerlings were distributed and gaining a 20% increased profit.

Through this village level hatchery, African catfish fingerlings serve as additional source of income to farmers who rely on crops as their primary income, and ensures availability of fingerlings to grow-out producers within the reach of the community.

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under Aquaculture and Fisheries Program

What to do with invasive aquatic species

IAS is described as, organisms introduced in an area and spread outside their distribution and threatens its biological diversity. They are prolific and can easily establish their population in the introduced areas, can endanger other organisms and the ecological properties of the environment.

IAS that are found to be of high risk for freshwater and brackishwater areas in Pampanga are Thai catfish, mudfish, softshell turtle, janitor fish, Asian swamp eel, and blackchin tilapia, that caused huge damage in the aquaculture areas of Pampanga.

Economic cost of the invasive aquatic species outweighs its economic benefit. Factors contributing in cost are loss in income, cost for control, increase in labor, while factors contributing to economic benefit is the potential of IAS as raw ingredient for value addition.

The collected IAS were developed as feed, food products, and other agri-related products, namely, mushroom fruiting bags; charcoal briquette; blackchin tilapia-based frymash; smoked blackchin tilapia in a bottle; fermented rice with mudfish; water hyacinth- and water lettuce-based growing medium for hydroponic system.

Three categories of policy recommendations on IAS were crafted: a) Policy recommendation concerning the introduction of species to be cultured, b) Policy recommendation on the prevention and control of invasive species in the aquaculture areas, and c) Policy recommendation on the restoration of native biodiversity.

thematic program

National Organic Agriculture Program

NOAP is one of the banner programs of the DA created through Republic Act No. 10068 or the Organic Agriculture Act of 2010. The program envisions the organic agriculture sector to contribute to the country's overall agricultural growth and development, in terms of sustainability, competitiveness, and food security.

In accordance with the NOAP, the DA-BAR leads the strategic management, coordination, and development of breakthroughs in organic agriculture R4D programs and activities. DA-BAR coordinates with DA national and regional offices, state universities and colleges, and other research institutions in developing and promoting packages of technologies for organic agriculture.

featured technologies

under National Organic Agriculture Program

Revealing health benefits and profitability of Ceylon tea

Known to contribute various benefits to human health, Ceylon tea is among the recommended morning or afternoon refreshing beverage. With its known promising potential in boosting metabolism and immunity; a rich source of antioxidants; and reducing blood pressure, blood sugar levels, and loss of collagen in skin, Ceylon tea production and processing is a profitable industry to venture into.

To support this goal and address gaps from production, processing, and marketing of tea in Zamboanga Peninsula, DA-Zamboanga Peninsula-La Paz Experiment Station led the technology-transfer and commercialization of Ceylon tea in the region. A total of 12,149 planting materials and 80 sacks were distributed to 56 members of Poblacion Women's RIC, a multi-purpose organization engaged in various projects in Bayog, Zamboanga del Sur.

With production sites established, PWRIC members also underwent training and capacity-building activities on production of Ceylon tea cuttings and its proper cultural management practices, production, and processing.

Ceylon tea's promising potential was revealed through the conduct of a feasibility study and sensory evaluation. The black Ceylon tea variant was remarked as highly acceptable to coffee drinkers aging from 31-50 years old and moderately to extremely acceptable to non-coffee-drinkers for its aroma, flavor, and color. Meanwhile, the green tea variant was popular to coffee drinkers aging from 41-50 years old and was remarked as neutral to extremely acceptable by non-coffee drinkers.

Profitability analysis showed that break-even for tea business can be achieved at 4 years and 8 months following the field establishment. With continuous production and processing for 5 years, Ceylon tea can have a remarkable return on capital of 426.19%.

Promoting meat processing of organically-grown native pigs

Due to its promising marketability and low production cost, native pig farming has a significant potential to provide sustainable income not only to pig raisers but also to food processors and entrepreneurs.

With funding support from the DA-BAR, DA-CALABARZON promoted the adoption of value adding technologies in meat processing as well as technology on organic native pig production to native pig raisers in partner-municipalities in Batangas and Quezon.

Series of capacity-building activities enabled 155 native pig growers from three FCAs namely: Munting Sambayanang Kristiyano-Magsasakang Sinusunod ang Organikong Pagsasaka; Bonliw Farmers Association; and the First Nasugbu Natural Farmers and Irrigators Association to be trained on organic native pig raising and meat processing of saleable products such as tocino, *tapa*, *longganisa*, sausage, and *embutido*.

Two out of the three FCAs have been certified by the Food and Drug Administration with license to operate, giving a better opportunity for their products to reach bigger markets, and turn native pig meat products more acceptable to consumers. By promoting the availability of locally-produced and quality native pig meat products in each partner-municipality, the upscaling of meat processing technology generated jobs for locals and increased the income of native pig raisers and processors. Developed by the Organic Agriculture Research and Development Center of DA-CALABARZON, the research-bred technology opened new avenues of opportunities for farmers and entrepreneurs and continues to expand the advantages of native pig farming–solidifying the commodity's contribution to industry and the sector.

thematic program

Climate Change R4D Program

The Climate Change R4D Program of the DA-BAR covers specific measures that address challenges and threats posed by the changing weather patterns affecting the livelihood of rural communities and the country's food security. The R4D program is in support to Republic Act 9729 or the Climate Change Act of 2009 which mandates the mainstreaming of climate change in policy formulation. It follows the policy thrust of the DA Climate Change Program which is anchored on two pillars: mitigation and adaptation, with adaptation as the anchor strategy and mitigation measures as a function of adaptation.

featured technologies

under Climate Change Program

In 2023, the bureau revitalized its efforts and strategies to provide support and appropriate interventions towards the goal to accelerate climate change resilience in agriculture, natural resources, and the environment in the country. The bureau convened various national and international partner agencies to craft policy reform agenda in line with the DA-Climate Change Action Program. These include improving technical capacities and increasing the R4D investments for climate resiliency.

The Asian Development Bank, NIRAS, and Technical Assistance implementing agencies (Departments of Agriculture, Finance, and Environment and Natural Resources) started its initial works on the technical assistance that will support three R4D activities to develop climate-smart agriculture technologies on abaca value chain, seaweed, and livestock. DA-BAR serves as one of the executing agencies.

Meanwhile, DA-BAR also convened key representatives, and climate change team focals for a Consultation Workshop on the Consolidation and Harmonization of the Agri-Fishery Climate Change R4DE Agenda and Programs 2024-2028. These shall focus on the R4D initiatives and outputs of the various institutions on climate resiliency focusing on identifying technology gaps, scaling pathways and drafting the harmonized priority R4DE areas for the next medium term.

thematic program

Biotechnology Program

The DA-Biotechnology Program aims to help create an enabling environment for the development and better use of agricultural biotechnology as one of the technology options for food security, sector competitiveness, and resilience to climate change.

Pursuant to the Agriculture and Fisheries Modernization Act of 1997 (RA 8435), the Program was created to help the agriculture sector move from resource-based to technology-based through development of a wide range of biotechnology techniques. The Program also aligns with the national policy statement on modern biotechnology emphasizing on the safe and responsible use of modern biotechnology and its products.

featured technologies

under Biotechnology Program

Determining authenticity of coffee sold in the Philippine market through molecular-based method

CvSU-National Coffee Research, Development and Extension Center developed a DNA-based detection protocol to verify the authenticity of the coffee sold in the market, which are vulnerable to adulteration due to its high market value. This technology will be able to demonstrate the utility of the method in determining the authenticity of green beans, and roasted coffee.

The project team was able to develop the following outputs: 1) optimized protocol for extracting DNA from green coffee beans, roasted and ground coffee; 2)optimized PCR protocol using specific primers for green beans. roasted and ground coffee; and 3) optimized PCR protocol using universal primers in differentiating *Coffea* species from the selected possible plant contaminants.

Traditionally, farmers, processors, and coffee traders typically assess their samples by examining the physical characteristics of the beans. However, this approach has its limitations, particularly because beans from different species may appear similar. Moreover, verifying the authenticity of coffee becomes more difficult once the beans are roasted and ground. Through this technology, we could help several coffee stakeholders in verifying the authenticity of the coffee products sold in the market.

The protocol was validated by a third party: 2 from academic institutions, 1 private company and 1 from CvSU under Food-Borne Pathogen Laboratory.

The results of the study can serve as basis in crafting standards for coffee as a tool in monitoring green beans, roasted and ground coffee for authenticity and labelling.

Detection and management of pest and diseases

Molecular diagnostic platform for poultry pathogens
Beneficial for rapid diagnosis of poultry diseases, the three Philippine State Universities, UPLB, CvSU, and University of Eastern Philippines, developed a low-cost handheld integrated molecular diagnostic device for rapid detection at point of need for three bacterial (*Salmonella sp.*, *Mycoplasma spp.*, and *Escherichia coli*) and three viral pathogens (Newcastle Disease Virus, Infectious Bursal Disease Virus, and Infectious Bronchitis Virus).

The LMDP is considered to be 90–95% cheaper than conventional PCR with a more rapid result turnover of an average 60 minutes in comparison to 4-8 hours in PCR. The cost per test when using LAMP Assays is also 80% lower than the conventional PCR and RT-PCR kits, making the LMDP device and the developed assays economically viable most especially for farms in areas with limited resources.

This systematic approach in dealing with poultry disease prevention and control can help mitigate the risk/threat in poultry farming. It aims to identify the truly infected ones and halt the spread of diseases. This will also prevent undue culling or unnecessary treatment particularly with antibiotics as such wrong practice may lead to the further emergence of multi drug resistant strains.

CRISPR-Cas9 for banana bunchy top virus
The project team from UPLB establishes the groundwork for fully utilizing the potential of modern biotechnology tools in investigating BBTV susceptibility and resistance, as well as developing markers for marker-assisted selection for future breeding applications and disease diagnostics in banana.

The team delved into the DNA profile of the available genetic resources to understand its biodiversity for utilization in banana breeding. A cost-effective genetic technique that gives a detailed look at the genetic makeup of these bananas was developed.

Further, the team was able to identify resistance genes that help wild bananas fight the virus. Some genes that the virus uses to have a successful infection process were also discovered. The research findings were confirmed by repeating the experiments with a different molecular method, and further establishing a specific control gene. Results showed that genes in bananas that can resist the virus and the ones that can't, indeed react differently when BBTV was introduced. Utilizing the information, the project team used DNA marker technology to come up with a robust and cost-effective technique to tag the banana genes.

The team has also pioneered an efficient method to detect BBTV. This technique not only measures how much virus is present but is also sensitive enough to test many samples at once, streamlining the research as well as serving the industry.

featured technologies

under Biotechnology Program

Biopesticide against fall armyworm in corn and onion

The UPLBFI research focused on developing an effective biopesticide targeting FAW and OAW through strategic utilization of various combinations of microbial agents.

Bugcheck is a biopesticide formulated to control the armyworms infesting corn and onion. It contains microbials namely: *Beauveria bassiana* and *Bassilus thuringiensis* as active ingredients.

Laboratory experiments were conducted to evaluate artificial diets for mass rearing of FAW and OAW, with particular emphasis on the UPLB-IPB modified and Nalin diets. Subsequent field trials and bioefficacy experiments led to the identification of BugCheck as the optimal formulation for FAW. Challenges encountered during the continuous laboratory mass rearing of OAW, characterized by slow development and low survival rates, prompted the development of six formulations, ultimately selecting BugCheck for further refinement based on bioefficacy evaluations. Field trials convincingly demonstrated the efficacy of BugCheck in controlling FAW infestations in maize crops, yielding results comparable to those achieved with a conventional/ commercial pesticide.

Similar positive results were observed in OAW control, with BugCheck proving effectiveness in onion fields. Toxicology tests confirmed the safety of BugCheck, while the final field efficacy testing revealed its capacity to mitigate damage caused by target organisms without significant effects on non-target counterparts. *Ex-ante* analyses involving 392 farmers showed a promising trajectory for commercialization, as farmers expressed a willingness to adopt BugCheck due to its economic advantages and perceived environmental and health benefits. Financial analyses indicated a favorable return on investment at 31%, thus, attracting interest from prospective investors. BugCheck can now be registered to DA-Fertilizer and Pesticide Authority and be eventually commercialized.

Mudfish production using induced spawning hormones

Effective and low-cost techniques for induced spawning and rearing of the mudfish were developed by DA-NFRDI, optimizing natural and synthetic hormones for mass production.

In October 2023, a total of 210,506 mudfish fingerlings were produced, of which 100,100 pieces of mudfish fingerlings were dispersed to fisherfolk beneficiaries from Cagayan Valley and Central Luzon and to the Balik Sigla sa Ilog at Lawa Program of the DA-BFAR in Cagayan Valley and Central Luzon.

High spawning, fertilization, and hatching rates with high relative fecundity and at considerably short latency and incubation periods were observed on mudfish breeders injected with hormones.

The development of practical and adoptable induced spawning techniques will encourage fisherfolks to cultivate this species that will ease fishing pressure from the wild and aid in its conservation.

Introducing cost-effective induced spawning agents could lower production costs which will be very beneficial to fisherfolk. Mudfish production will increase freshwater fish production for national food security.

featured technologies

under Biotechnology Program

Optimized protocols for fish protein hydrolysates from tuna viscera

The University of the Philippines Visayas has successfully optimized enzyme hydrolysis conditions for producing yellowfin tuna viscera fish protein hydrolysates using Response Surface Methodology, generating mathematical models to predict yield, protein content, and degree of hydrolysis.

The project's findings show that RSM is an effective tool for optimizing enzymatic hydrolysis conditions, producing reproducible, robust, and reliable results. Different hydrolysis conditions can also apply different enzymes, which can be tailored-fit to achieve desired results.

This optimization approach can also be applied to other processing wastes, benefitting waste management in the tuna industry and contributing to food security by efficiently utilizing fish by-products.

Production of drought-tolerant saba

Bananas are the prime fruit commodity in the Philippines and are widely grown throughout the country. Farmers and growers have been clamoring for banana planting materials as a cash crop since the pandemic.

Tissue-cultured clones of drought-tolerant and semi-dwarf Saba that are high-yielder have been identified by the Fruit and Ornamental Section of the Institute of Plant Breeding through a previous project aimed to develop and mass propagate these plants to be distributed to farmers through a tissue culture system.

A total of 7,600 tissue-cultured Saba banana plants were distributed to farmers in drought-prone areas of the provinces of Cagayan, Quezon, Rizal, Laguna, Nueva Ecija, Tarlac, and Pangasinan through their respective municipal agriculture offices. Further, a Saba banana tissue culture technoguide was developed and also distributed to farmers.

thematic program

Scaling R4D

Scaling R4D deals with the processes of replicating and refining A&F technologies with validated effectiveness and efficiency through a program delivery structure to achieve the large scale of coverage and equitable access to agricultural innovations and realization of improved social, economic, and environmental benefits.

featured technologies

Scaling R4D

Soya products in Quirino province

The Quirino State University aims to promote and commercialize bakery and snack products using soya flour as base ingredient, that are healthy and high-protein food. These include soya pandesal, soya nuggets, soya butterscotch, banana soya bread, and soya loaves.

To sustain the source of raw materials for product processing, interested soybean farmers entered into a contract growing scheme, who were assured of a 116% rate of Return of Expenses. Equipped with the package of technology on the production of soybean, a farmer cooperator can produce 2,175 kg per hectare with a net income of PhP 40,000 per hectare per cropping season. Six hectares soybean production demonstration areas located in the Municipalities of Diffun, Aglipay, Maddela , and Nagtipunan, were established with six farmer-cooperators as contract growers for the project.

Project partners include 10 soybean farmers, soybean processors, entrepreneurs of bakery products, and four soy product adopters.

Of the four soy product adopters, the QYEA topped the sales amounting to PhP 3,417,983, for selling soya products to DepEd and DSWD feeding program. A memorandum of agreement was entered into by the QYEA as producer of soya products to the feeding program of DepEd and DSWD of Diffun and Maddela.

Twelve Technology Licensing Agreement was entered among the adopters of these soya products, stipulating their role to adopt and commercialize the technology transferred to them by the soya project of the University.

Upscaling Daerrys tilapia ice cream and cookies

With the technology developed to eliminate the fishy flavor and after taste of tilapia *(Oreochromis niloticus)* following a series of steps in cleaning, cooking, and made into flakes, these value added products were produced: tilapia ice cream classic cups; tilapia ice cream classic sandwich; tilapia ice cream praline crunch; tilapia ice cream fryewich; tilapia oatmeal cookies fingerleengs plain; and tilapia oatmeal cookies fingerleengs choco dipped. Nutritional analyses showed that the products contain more protein than the commercially available ice cream, that can be marketed as a high-protein dessert and snacks and can help provide more protein to children and individuals to alleviate malnutrition.

Capacitating tilapia farmer-partners, Manggagawang Bukid ng Guimba Agriculture Cooperative, to be part of the supply chain of the spin-off company, the Vera Bella Enterprises Limited Company provided additional income and helped create livelihood. The latter was registered with the Security Exchange Commission.

As part of the legal requirement in the technology transfer, two Technology Licensing Agreements were forged, with CLSU and as an incubatee of CLSU-Agri-Fisheries Technology Business Incubation.

After a very low production and sales during the Pandemic, the production volume was increased with 430% in 2022 or 21,838 pieces and sales volume of PhP 1,081,010 which was due to the issuance of Food and Drug-License to Operate to the spin-off company, consistent supply of raw materials produced by MABUNGA cooperative, and massive online marketing and promotion. And in 2023, a production volume of 37,342 pcs (increase of 70.99% from 2022) and annual sales volume of PhP 3,372,899.85 (increase of 212.01%) from 2022 was reached.

Currently, the Daerrys products are distributed in Nueva Ecija, specifically at Milka Krem, Science City of Munoz, Philippine Carabao Center at CLSU, Daerrys Scoop 'N Bites, Shell Select , Mega Shell, and Sumacab Cabanatuan City; Shell Select Gumamela, San Leonardo Nueva Ecija, and Fuel Star Gas Station Bantug Science City of Munoz Nueva Ecija.

Partnerships and agreements with small business enterprises like Kaffeina Café, Enrico's Food Products Trading, EDJE Food Products Manufacturing, and Justainable Philippines were also established. A Joint Venture Agreement was also forged with PWD Smart Farmability, Malaysia, to introduce the products to the global market. And in the early 2023, first tilapia ice cream shop-Daerrys Scoop 'N Bites-opened to the public, showcasing various products and menus highlighting Daerrys tilapia ice cream and tilapia cookies.

The success of Daerrys tilapia ice cream and tilapia cookies contributed significantly to one of the priority areas, technology transfer and commercialization in the market through outscaling.

featured technologies

Scaling R4D

Ready-to-drink and ready-to-eat from passion fruit, *bignay* and *lipote*

Underutilized fruits such as passion fruit, was used to blend with bignay, and lipote to produce ready-to-drink juices and preserves. The products will be bio-fortified with a significant amount of vitamins, minerals, and nutraceuticals. With the potential health benefits, these will diversify the available ready-to-drink fruit juices and ready-to-eat preserves in the market.

Through the project, the processing of fruits into puree were standardized by the project team for optimum extraction, process efficiency, and to ensure consistent quality specification for the ready-to-drink fruit juice drinks and ready-to-eat fruit jelly snacks.

Freezing the lipote and bignay berries for at least 12 hours, aid in better puree extraction while lessening expenses for use of enzymes during extraction. Lipote and bignay puree production involves, washing of fruits; juice extraction using pulper; waste output (seeds and peels); puree pasteurization; sealing and packaging in polyethylene bags; and cooling of puree.

Pre-processing of passion fruit for puree extraction includes, sorting and washing; halving/cutting; separation of rinds and pulp, and separation of seeds; extract homogenization; and extract filtration.

An FGD was conducted for a more market-centric product and identify target market segments, evaluating the color, aroma, texture, flavor, sweetness, sourness, size, packaging, price, and availability. The FGD was followed by sensory properties evaluation of the ready-to-drink juice blends, and microbial analysis.

Shelf-life analysis of products through accelerated storage to determine changes that may affect the product acceptability were also done, before the newly developed product enters the market for distribution.

Ready-to-drink products developed include passion fruit juice, passion fruit-lipote juice, and passion fruit-bignay juice, while ready-to-eat jelly snacks are passion fruit jelly, passion fruit-lipote jelly, and passion fruit-bignay jelly.

Farmer-partners, PFVGMAL and SINLIKAS Import Export Packaging, underwent trainings on good manufacturing practices, sensory evaluation, and alpha testing of food products to equip the processors with the skills for better product development. The PFVGMAL is the major supplier of the raw materials and the SINLIKAS provides the processing facility. The project team also assisted the farmer-partners on the different label designs for their products.

The collaboration of the UPLB and project's farmer-partners resulted in increased utilization for passion fruit, lipote, and bignay. The developed technologies provided an avenue to generate additional income for project partners, as well as job opportunities for their communities.

Product and market enhancement of *galyang (Cytosperma chamissonis)* taro chips

An underutilized commodity in the Philippines, galyang, is commonly used as feed for livestock only. The Ifugao State University through its Extension and Training Services offers technology transfer activities, particularly on food processing, to sectoral community organizations, to establish entrepreneurial activities to generate income.

One sectoral group, the ECWO was a recipient of the university's training services on the processing of taro chips and have been selling the product through E-Care program of the Episcopal Diocese of Santiago, and network of other government agencies in the province.

However, low production of taro chips is due to limited production materials and equipment to cater to a bigger market. This was addressed by the project through the provision of processing materials and equipment to increase production and meet the demand of growing taro chips market.

Through the project, farmer cooperators who are into giant taro production, maintain the established galyang production sites and earn additional income. The same goes to the 20 members employed in the daily production and operations of the project, earning a daily wage of PhP 350/day.

Thirteen enterprising women of ECWO produce quality taro chips learned from the seminar-workshops provided. With the innovative and entrepreneurial skills of these women and the improvement of the processing center, they were able to widen the market and generate income and improve the ECWO's livelihood.

With the income generated from the project, the organization was able to establish its own processing center, capacitating almost 100% of the members through trainings, seminars, and field exposure.

featured technologies

Scaling R4D

Promoting legume products through technology business incubation

Capitalizing on the region being the peanut and mungbean capital of the Philippines, the Cagayan State University established the CVLTBI, that functions as a startup enabler that nurtures and bridges the gap between the legume industry and university research and innovation through technology generation and transfer, providing technopreneurial training and linkage to the startup ecosystem.

The establishment of an incubator is needed to support the implementation of Innovation Startup Act or RA 11337, to give holistic and effective services to startups for the creation of a viable and competitive legume-based enterprise.

Initial activities included, building the ATBI facilities, training staff, creating a conducive workplace, and conduct of various programs such as, technology pitching events, business summits, and mentoring sessions equipping incubatees with essential skills, including market linkages and product enhancement, that enabled them to expand their market presence and generate income.
Four technology pitching activities were conducted in response to the perceived legume industry bottlenecks, where 35 out of the total 72 innovative technology ideas presented by 93 young entrepreneurs were pre-selected to undergo the technology incubation process for further development and support.

After a thorough process of screening, assessment, and evaluation, there were eight potential incubatees and five successful incubatees who signed the Memorandum of Agreement and Terms of Reference for the incubation program, clarifying the mutual expectations, responsibilities, and the scope of the incubation program.

Further, specialized workshops and training programs focusing on specific sector such as peanut production; postharvest; processing; entrepreneurship; and peanut production and postharvest mechanization technologies, were organized to provide indepth knowledge about the peanut industry and related technologies.

Furthermore, the CVLTBI initiated the application and publication for Utility Models of three selected incubatees' products to the Intellectual Property Office of the Philippines.

featured technologies

Scaling R4D

Intended to provide an outscaled adoption of the DA's YLP, that aims to enhance agricultural productivity through Bhoochetana principles, the DA-BAR has implemented the Sustainable SCALE-UP Program. Bhoochetana, developed through the program assistance of the International Crops Research Institute for Semi Arid Tropics, was a science-backed soil revival project adopted in India that resulted in a significantly higher crop yield, enhanced farmers' income, and improved nutrition and livelihoods.

An enhanced YLP approach, the SCALE-UP program seeks to establish innovative and sustainable agricultural strategies and practices, targeting a 15% increase in the yield and income of farmers. As of its initial take-off in 2022, DA-BAR has piloted the SCALE-UP program in Ilocos Region, CALABARZON, Eastern Visayas, and Zamboanga Peninsula. It highlights various soil health activities such as developing regional crop suitability and water resource map; conducting GIS-based soil health thematic maps with corresponding fertilizer recommendations; distributing and disseminating soil health cards, among others.

In 2023, the pilot regions were able to establish coordination within the municipal and barangay levels as well as identify, assess, and evaluate their respective best management practices for intervention. In Ilocos Region, the first batch of Soil Health Cards was distributed and discussed with the farmer beneficiaries at the four project sites. For CALABARZON, the project team was able to prepare soil fertility maps, specifically for the municipality of Plaridel. Meanwhile, Eastern Visayas was able to complete the soil macro and micro analysis by the DA regional field office's soils laboratory. Lastly for Zamboanga Peninsula, the regional SCALE-UP team was able to conduct soil sampling and Geo-tagging activities across the municipalities of San Miguel and Guipos.

To further the impact of this program, the bureau is yet to expand the implementation of SCALE-UP in more regions.

institutional development

Human Resource Development

Research Facilities Development

institutional development

Human Resource Development Program

The DA-BAR, through its Human Resource Development Program, aims to increase the workforce capability of the A&F research system of the country. The program intends to increase the number of post-graduate degree holders for the improvement of efficiency in the conduct and delivery of A&F R4D. In addition to the degree scholarship program, the bureau actively engages in productivity enhancement initiatives. Specifically, the bureau fulfills the role of serving as the secretariat for the Scientific Career System and assumes the responsibilities of chairing and providing secretariat support for the Screening Committee for Certification of Eligibility under the Magna Carta for DA S&T Workers.

institutional development

Degree Scholarship Program

In 2023, the bureau supported 10 MS degrees and five PhD degrees scholars, eight of which were ongoing (6 MS and 2 PhD) while seven are new scholars (4 MS and 3 PhD).

Started in 2000, the DSP of the bureau aimed to develop a cadre of highly competent researchers and research technical staff with academic achievements in agriculture, fisheries, and other related fields. The program was implemented in support of personnel and institutional development of R4D centers/institutions leading to a more innovative and enabling R4D system.

The DSP has already provided degree scholarship assistance to 192 researchers and staff from the National Research and Development System for Agriculture and Fisheries. The program has already produced 129 graduates, of which 68 R&D personnel have MS degrees while 61 R&D personnel earned their PhD degrees.

Scholars Fellowship Activity

"This time is a call for collaboration of all the bureau's scholars. Let us talk about how we could collaborate further. We are considering you not just as scholars, but as mentors of the DA-BAR family. We need to sustain and pursue more activities in our respective offices as well for the good of the nation," underscored DA-BAR director Junel B. Soriano, PhD, in his welcome message during the DA-BAR Scholars' Fellowship held at the Luciano Salazar Hall, Ang Bahay ng Alumni, University of the Philippines Diliman, Quezon City on 23 November 2023.

Aimed to strengthen the network of the growing number of scholars, the event convened and gave recognition to scholars, both current and those who have completed their degrees.

With gratitude, five scholars gave testimonies on how they surpassed the graduate studies with perseverance and passion in the hope of contributing knowledge and expertise for the benefit of the agriculture and fisheries sector.

The event was jointly organized by the DA-BAR and the UPLBFI.

Scientific Career System

In 2023, the bureau's SCS admitted 10 applicants, of which 7 were for admission and 3 for rank upgrade. Eight qualified applicants were endorsed to DOST-National Academy of Science and Technology, wherein five are for admission and three for rank upgrade.

The SCS was formally organized on 19 July 1983 with the issuance of Executive Order No. 901. The establishment of SCS was further reinforced by Section 4 of R.A. 8439 entitled, Magna Carta for Scientists, Engineers, Researchers, and Other Science and Technology Personnel in Government. Used for the evaluation and endorsement of applicants, the SCS is useful for the recruitment, career progression, recognition, and reward of scientists in the public service, as a means of developing a pool of highly qualified and productive scientific personnel.

The system shall be characterized by 1) entrance to and career progression or advancement based on qualifications, merit, and scientific productivity, 2) career paths that shall allow scientists to develop within their respective areas of expertise without leaving their status as scientists, and 3) incentive and rewards to ensure attraction and retention of highly qualified persons in the science and technology sector.

Magna Carta for DA S&T Workers

DA-BAR, as the secretariat, facilitated the evaluation and endorsement of 2,534 applicants in 2023, of which 865 were new and 1,699, were for renewal. Of the total applicants, 2,447 were approved and received the certificate of eligibility.

DA issued Special Order 1084 designating the DA-BAR director as chairperson of the Screening Committee and the bureau as the secretariat in 2022. The Republic Act 11312 stipulates that those, "Not employed by the DOST personnel, but are involved in Scientific and Technological Activities may avail of the benefits under Republic Act 8439 or Magna Carta for Scientists, Engineers, Researchers, and Other Science and Technology Personnel in the Government."

institutional development

Research Facilities Development Grant

DA-BAR recognizes the need for modern and functional R4D facilities and equipment that could allow and provide Filipino scientists and researchers with the necessary tools and boost their capabilities to help address the problems that the agriculture and fisheries sector is facing.

Through the Research Facilities Development Grant program, the bureau envisions that the majority of the R4D facilities across strategic hubs and networks in the country will be modernized to best serve the priority needs of the agriculture and fisheries community. Likewise, the program aims to be more responsive to the needs of the farmers and fisherfolk, being the main beneficiaries of the facilities. In 2023, a total of four upgraded facilities were accomplished through the DA-Agricultural Competitiveness Enhancement Fund's R4D Grant program while one facility was inaugurated with funding support from the bureau's regular fund.

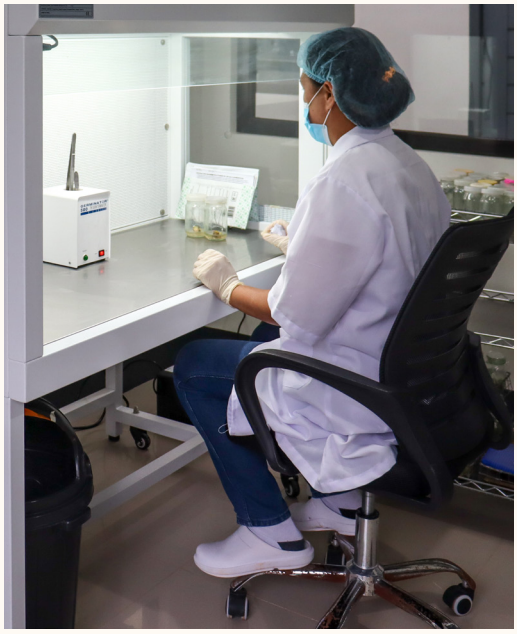
institutional development

Research Facilities Development Grant Program

In response to the growing farmers' demand for tissue-cultured saba plantlets in SOCCSKSARGEN, the tissue culture facility of the Mindanao State University had strengthened its institutional capacities through a facility upgrade. The upgraded features such as the chemical stockroom, media room, propagation rooms, and growth rooms allow efficient and high-yielding production of tissue-cultured banana plantlets. By sustaining a minimum produce of 180,000 disease-free and hardened tissue-cultured banana seedlings per year, the enhanced capacity of the university's tissue culture facility will continue to significantly increase its support, making it readily available both to commercial farmers and members of the farmer cooperatives and associations. Further, this provides a systematic and equipped facility for plant biotechnology researchers.

In University of Southeastern Philippines, a tissue culture laboratory was also upgraded to address the high contamination rate affecting the production capacity of banana seedlings. By providing better control over environmental factors such as temperature, humidity, and air quality, and by implementing advanced sterilization systems, the upgraded laboratory was able to significantly reduce the risk of contamination resulting in an improved efficiency and production of banana seedlings. From merely producing 6,000-8,000 seedlings per month, the enhanced USeP's is now capable of producing 20,000 disease-free and quality banana seedlings.

Due to the lack of continuous supply of fingerlings hampering the operation and expansion of fish farming in Romblon, the Romblon State University upgraded its hatchery facility to increase the production of fish fry and cater to the needs of small-scale fisherfolk. With provisions on circular and rectangular tanks for holding, breeding, and nursing of fish and culture of natural foods and other necessary equipment, the upgraded 81-sqm roofed hatchery building improved its capacity in distributing quality seeds to aqua farming communities and as an avenue for research, extension, production, and instruction activities of the university.



institutional development

Research Facilities Development Grant Program

To boost the productivity and profit of both food processors and farmers, the crop processing facility of the Quirino State University was refurbished due to its limited capacity and equipment. With the improvement on its food processing units and acquisition of equipment such as pulverizer, cabinet oven, hydraulic slicer, dehydrator, and other processing equipment, the upgraded facility sustained the production of food products from soya and bignay such as flour and butterscotch; and fruit juices and wine, respectively. More importantly, the upgrading led to the development of new and high-grade food products such as the ubi powder while opening new opportunities for farmers as suppliers of the raw materials. With these improvements, both food processors and farmers gained increased profit from their sustained production of products and crops, respectively.

To strengthen its R4D activities toward enhanced agri-food systems, promotion of potential agri-based enterprise, and environmental sustainability, the Regional Integrated Agricultural Research Center of DA-MIMAROPA established the Technology Commercialization R&D Center. With funding assistance from the RFDG program of DA-BAR, the facility now serves as an avenue for Regional Integrated Agricultural Research Center's project investments on organic farming research and food processing and product development. Moreover, this shall cater the promotion of value adding and commercialization of products such as bignay wine, preserved mushroom and fruits, and organic meat products at the same time providing a centralized venue for stakeholders' meetings and other capacity-building activities.

other programs and support services

PARTNERS Approach

Intellectual Property Rights

Knowledge Management and Information Systems

other programs and support services

PARTNERS approach

Constantly seeking innovative mechanisms and exploring more effective ways to deliver its services, the bureau has introduced a new approach towards improving its R4D system. The Participatory Agriculture and Fisheries R4D Technology Transfer toward Entrepreneurship and Sustainability or PARTNERS approach aims to bring tailor-fitted interventions to local stakeholders in selected areas or communities based on the results of the Participatory Rural Appraisal. An additional instrument that will complement its existing programs, this approach is expected to proactively engage the farmers and fisherfolk and strengthen collaboration among stakeholders in achieving an inclusive development. It is an approach which pursues a more developmental viewpoint in packaging R4D interventions through technology transfer and scaling activities focusing on areas/ communities with low agricultural productivity leading to high poverty incidence.

The DA-BAR, in collaboration with DA regional field offices (Caraga, MIMAROPA, Bicol Region, Northern Mindanao, Davao Region and SOCCSKSARGEN) and Local Government Units of the identified municipalities conducted scoping, appraisal and validation activities. Based on the needs of

the identified community, each DA regional field office packaged R4D project proposals for full implementation this 2024.

The comprehensive set of interventions and initiatives aimed at enhancing agricultural productivity and development in the Philippines which encompass various aspects of the agricultural value chain, from production management and postharvest facilities to market linkages and capacity building. Key components include the introduction of integrated farming systems, provision of quality planting materials and machinery, enhancement of cultural management practices, improvement/ establishment of farm to market road, establishment of technology demonstrations, and addressing challenges such as pests, diseases and climate change. It also emphasizes the importance of community organizing, hands-on training, seminars, and innovative financing mechanisms to support farmers.

other programs and support services

Intellectual Property Rights for Assistance

In line with the DA's intellectual property policy and technology transfer protocol, DA-BAR, continuously provides intellectual property assistance for scientists and researchers to protect their research outputs from DA-funded R4D programs and projects. Prior to submission for application to the Intellectual Property Office of the Philippines, research outputs are evaluated to assess its IP potential. The bureau's assistance also covers compliance with the Intellectual Property Office of the Philippines' examination reports.

In 2023, DA-BAR assisted the DA-Bicol Region in drafting claims and online filing for a utility model on the process for producing milk from Pili (*Canarium ovatum*) kernels. The utility model relates to a process for producing milk from Pili kernels using wet process method. The process includes hydration, disintegration process, addition of stabilizer and pasteurization.

DA-SOCCSKSARGEN was assisted in trademark application for the logo to be used in the ATBI Program of the DA regional office.

A utility model on the process of making sans rival as a flavoring for tilapia ice cream by the CLSU was also assisted by DA-BAR. This process is a series of steps in preparing a caramel mixture and folding the mixture in the tilapia ice cream. The tilapia ice cream with sans rival flavoring can be consumed as dessert.

knowledge management and information systems

The bureau maintains three social media platforms namely Facebook, Instagram, and Youtube, and one website. These platforms provide avenues to communicate and disseminate the crafted programs, strategies and supported projects, activities, R4D generated technologies, and bureau's conducted and participated activities intended for audiences. Further, these serve as avenues for knowledge exchange activities.

PUBLICATIONS

208 articles published

20 infographics shared

29 publications packaged

3,361 publications mailed

101 technologies disseminated

SCIENTIFIC LITERATURE SYSTEM

941 digitized knowledge products

359 libreng libro distributed

FACEBOOK
facebook.com/DABAROfficial

85.9K	FOLLOWERS
1.4M	REACH
37K	REACTIONS
59K	SHARES
221K	CLICKS
5K	COMMENTS

INSTAGRAM
instagram.com/DABAROfficial

1000	FOLLOWERS
2300	REACH
50	REACTIONS
31	SHARES
1100	CLICKS
8	COMMENTS

YOUTUBE
DABAROfficial

56.1K	SUBSCRIBERS
3.7M	VIEWS

WEBSITE
bar.gov.ph

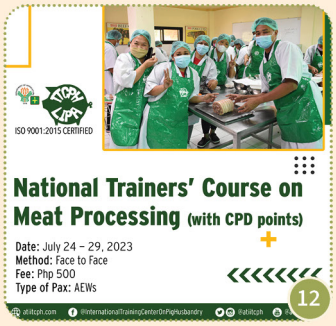
196K	PAGE VIEWS
70K	NEW USERS

MATERIALS POSTED	NUMBER OF POSTS (orange) NUMBER OF REACTIONS (R), COMMENTS (C), SHARES (S) (green)	FREQUENCY
Seminar-related		MONTHLY
Photo Releases (PRs) & At the Moments (ATMs)		DAILY
Testimonials & Tech in Focus		TWICE A MONTH
Tech Videos & Teasers		MONTHLY
Other Videos & Lives		IF NEEDED
Announcements		DAILY
Procurement Matters		DAILY
Reposts		DAILY

RANKING
highest to lowest

BASED ON NO. OF POSTS	BASED ON NO. OF R,C,S
PRs and ATMs	Seminar-related
Reposts	Testimonials & Tech in Focus
Procurement Matters	Announcements
Announcements	PRs and ATMs
Seminar-related	Reposts
Testimonials & Tech in Focus	Other Videos and Live
Tech Videos & Teasers	Tech Videos & Teasers
Other Videos and Live	Procurement Matters

TOP POSTS OF EACH TYPE OF MATERIALS



Total reactions, comments, and shares were the data considered in determinging the top posts of each type of materials as follows: (1) infographics - 6,866; (2) seminar invite - 1,798; (3) testimonial - 983; (4) tech in focus - 947; (5) seminar live - 799; (6) photo release - 782; (7) tech video teaser - 710; (8) tech video full - 648; (9) hiring - 624; (10) publication - 181; (11) FAQs - 128, and (12) reposts - 112.

ONLINE SEMINAR SERIES

NUMBER OF VIEWS

BASED ON ATTENDANCE

from January to December 2023

- 1,039 males
- 1,636 females
- 882 students
- 463 agriculturists / aquaculturists
- 232 researchers
- 227 teachers / professors
- 131 farmers / fisherfolks
- 68 agripreneurs
- 26 government / LGU employees
- 646 others e.g. OFWs, homemakers, fresh graduates, unemployed, etc.

48 materials

- 12 event invites
- 12 infographics
- 12 livestream
- 12 FAQs

INFORMATION SYSTEMS

- **7** developed
- **2** in progress
- **3** documentations
- **3** users manual packaged
- **1** training facilitated

linkages and partnerships

linkages and partnerships

Partnerships are crucial to the way DA-BAR works-whether with farmers, fishers and associations, state universities and colleges, non-government organizations and research networks both local and international.

In 2023, DA-BAR took steps to strengthen linkages and partnerships aimed at bringing greater impact.

Engagement with other government agencies and the private sector presents an opportunity for DA-BAR to deliver more efficiently its mandate, advance on the path to achieving the R4D agenda and programs, and ensure inclusive collaboration among R4D stakeholders. To complement efforts on technology transfer, DA-BAR and DOST-PCAARRD signed a Memorandum of Understanding on collaborative R4D and innovation sharing.

In addition, LGU Muñoz and Bauertek Corporation converged and collaborated for the establishment of a state-of-the-art research, manufacturing and development facility, a ground breaking ceremony which took place at CLSU and attended by DA-BAR. The bureau partnered with Bauertek Corporation aimed at linking stakeholders to the private sector that may provide further support in the implementation of R4D programs, projects and activities.

Building on the legacy as the national research coordinating agency of the DA, various initiatives with partners to capture better opportunities and forge strategic partnerships were organized. DA-BAR was actively involved in technical cooperation initiatives for agriculture with international institutions and organizations such as Kyungpook National University, French Agricultural Research Centre for International Development, Japan International Cooperation Agency, Asian Development Bank, and NIRAS Asia Manila Inc. Technical cooperation on knowledge exchange, policy reform agenda on climate change, and rainwater harvesting systems were among the R4D focus of collaborations. In addition, the preparation of a Memorandum of Understanding on agriculture and fisheries cooperation between the DA and Griffith University of Australia was facilitated by DA-BAR.

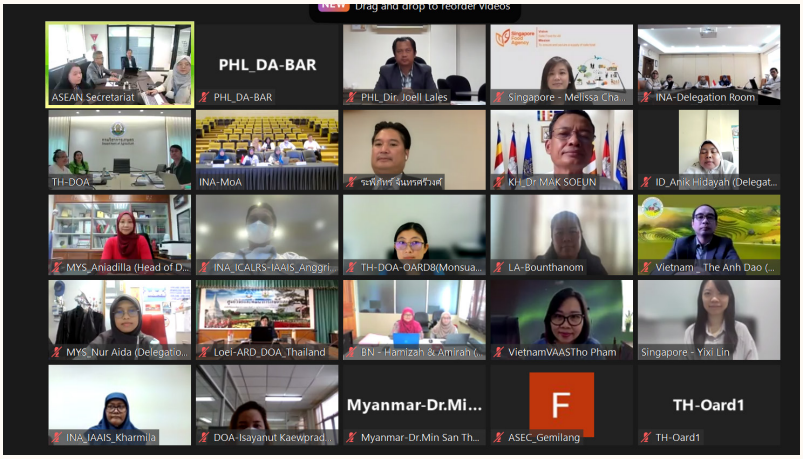
The bureau also maintained its membership to different international organizations to strengthen its network of collaborations and partnerships. These include the Consortium of International Agricultural Research Centers, IRRI, Centre for Agriculture and Bioscience International, ATWGARD, AFACI, among others. During the 8th Meeting of the ASEAN-CRN and 17th Meeting of the ATWGARD, DA-BAR served as chair for these meetings.

The importance of research for development in addressing current issues that beset its agriculture sector was highlighted by the DA, through BAR, during the 2023 AFACI Project Planning Workshop held on 11-15 September 2023 in Jeonju, South Korea. DA-BAR serves as the national coordinating agency for AFACI-funded projects in the country, focusing on soil atlas, vegetable breeding, stress-tolerant, high yielding rice varieties, Asian Food Composition database, and agricultural technology extension system.

Meanwhile, highlighting the need for rice industry stakeholders to convene, converse and converge in order to fast tract dissemination and scaling up of science-based innovations for food security, the 6th International Rice Congress was hosted by the Philippines through IRRI and DA. DA-BAR served as co-chair of the event.


WELCOME
HIS EXCELLENCY
FERDINAND R. MARCOS JR.
President of the Republic of the Philippines
6TH INTERNATIONAL RICE CONGRESS (IRC) 2023
PICC, PASAY CITY
16 OCTOBER 2023


Current Agricultural Issue and Proposal in the Philippines


PHL_DA-BAR
ASEAN Secretariat
PHL_DA-BAR
PHL_Dir. Joell Lales
Singapore - Melissa Cha...
INA-Delegation Room
TH-DOA
INA-MoA
KH_Dr MAK SOEUN
ID_Anik Hidayah (Delegat...
MYS_Aniadilla (Head of D...
INA_ICALRS-IAAIS_Anggri...
TH-DOA-OARD8(Monsua...
LA-Bounthanom
Vietnam_ The Anh Dao (...
MYS_Nur Aida (Delegatio...
Loei-ARD_DOA_Thailand
BN - Hamizah & Amirah (...
VietnamVAASTho Pham
Singapore - Yixi Lin
INA_IAAIS_Kharmila
DOA-Isayanut Kaewprad...
Myanmar-Dr.Mi...
Myanmar-Dr.Min San Th...
ASEC_Gemilang
TH-Oard1
TH-Oard1


Griffith
UNIVERSITY
Queensland, Australia

institutional updates

Technical Training

- Effective Communication:
  The Foundation of Highly Effective Organization
- Leadership in the Digital Era
- Go Negosyo trains DA-BAR-ATBI project implementers
- Refresher on knowledge management
- DA-BAR spearheads training on writing
  and publishing research papers
- KMISD initiates revision of DA-BAR strategic
  communication plan

Non-technical Training

- DA-BAR seminar-workshop on basic records
  and archives management
- Cultivating mental health and wellness to promote
  a safe psychosocial environment in DA-BAR
- Ethics and safe spaces: Promoting a value-driven workplace

Workshops

- Validation workshop for the process documentation
  and assessment of the implementation of DA-BAR's ATBI
  Program
- Seminar-workshop disseminates sandfish-based
  integrated multi trophic aquaculture systems
- DA-BAR Grants Manual and Intellectual Property Policy
  Orientation for R4D partner implementing agencies
- Consultation workshop for the consolidation and harmonization
  of the Agri-Fishery Climate Change R4DE Agenda and Programs
  2024-2028
- Technology Readiness Level workshop

Conferences

- 2023 International Society for Southeast Asian Agricultural
  Sciences International Scientific Congress
- Benchmarking of the Agricultural R4D Management System
  in Selected Asian Countries

institutional updates

Technical Training

Effective communication: The foundation of highly effective organization

This capacity building workshop was conducted as part of the bureau's learning and development pillar under the program to institutionalize meritocracy and excellence in human resource management. The workshop focused on how to develop and enhance interpersonal communication skills between and among employees. This activity is a way to boost employees' morale and confidence by enhancing their communication skills; develop one's listening skills and promote effective and collaborative exchange of ideas, thoughts and knowledge. In addition, it helps employees to effectively understand social cues, emotions and intentions behind words; and develop the social connection/ networks among BAR employees and promote team collaboration, team synergy, and social bonds.

Leadership in the digital era

As part of the bureau's learning and development core system, this seminar workshop was conducted to promote awareness on the importance of cultivating a digital culture to improve day-to-day decision making and processes, bridge the digital knowledge gap, utilize information and technology tools to increase efficiency and productivity in the workplace as well as improve the leadership skills of executives and supervisors through digital transformation.

Go Negosyo trains DA-BAR-ATBI project implementers

In order to bridge one of the gaps identified during the conduct of the capability-building workshop on ATBI program implementation, the DA-BAR, in collaboration with SEARCA, tapped Go Negosyo to conduct a two-day workshop titled, Capacity Building Workshop for Agripreneurship under the BAR ATBI Program, on 24-25 May 2023 to capacitate agripreneurs on financial management and business plan development.

This was attended by DA-BAR staff and ATBI project implementers from DA regional offices in Central Luzon, CALABARZON, Bicol, SOCCSKSARGEN, and Cordillera Administrative Region. The workshop consisted of lectures on Business Model Canvas, Accounting and Financial Management, and Business Plan Development. Go Negosyo mentors were from Polytechnic University of the Philippines, Virgen Milagrosa University Foundation Graduate School and Rizal Technology University.

Refresher on knowledge management

Organized by the Development Academy of the Philippines, DA-Bureau of Agricultural Research officials and staff participated in a training course on Knowledge Management on 24-27 October 2023 via Google Meet.

The training course, anchored on enhancing organizational productivity and growth, elaborated on the basic concepts and principles of knowledge management, and its framework and methodology; and discussed implementing fundamental concepts, practices, tools, and techniques in creating, sharing, and applying knowledge in the workplace. The participants also took part in various group exercises and presentations covered were participated by the participants.

DA-BAR spearheads training on writing and publishing research papers

In order to enhance staff knowledge, skills and abilities related to research paper writing and its stages, the bureau conducted a two-day training as part of the learning and development intervention titled, DA-BAR Orientation Training on Writing and Publishing Research Papers on 28-29 November 2023. This aimed to capacitate the participants in terms of effective and efficient identification of relevant and significant research topics for effective organization and analysis of data for quality and purposeful research papers.

KMISD initiates revision of DA-BAR strategic communication plan

Recognizing the urgency and need to position the government agencies as the preferred sources of information in the era of influencers, improve its communication strategies, the KMISD underwent a training on strategic communication plan on 6-7 December 2023 in Magalang, Pampanga. This activity aimed to continuously build and enhance the capacity and strengthen the knowledge and skills of the KMISD staff, evaluate and align the communication plan with current knowledge trends, and identify and address gaps in the current communication plan of the bureau.

institutional updates

Non-technical Training

DA-BAR seminar-workshop on basic records and archives management

The bureau recognizes the importance of proper and effective records management and that it provides numerous advantages akin to work-productivity, cost-savings and time efficiency. A briefing activity in preparation for the workshop proper on Records Disposition Administration was conducted on 17 October 2023. The three-hour activity was part of the technical assistance being extended by the National Archives of the Philippines. On 18-19 December 2023, the two-day learning and development intervention proper was participated by records custodians and other DA-BAR employees and staff involved in creating, managing and maintaining records and documents of their respective division/unit/section. This workshop aimed to further enhance the knowledge, skills, and abilities of the DA-BAR employees on records and archives management. It included other important processes in proper records management like mail management, files management and archives administration.

Cultivating mental health and wellness to promote a safe psychosocial environment in DA-BAR

This training on mental health awareness was conducted at the bureau and was participated by all staff and employees of different position levels. It was conducted through a hybrid set-up and utilized lecture, discussions and role playing activities. This learning and development intervention aimed to raise awareness on mental health in the DA-BAR and to reduce the stigma surrounding mental health issues.

Ethics and safe spaces: Promoting a value-driven workplace

The bureau conducted the seminar titled, Ethics in the Workplace on 21 December 2023 to reinforce its core principles of honesty, respect, accountability, professionalism and confidentiality as well as an effort to strengthen the ethical values of its personnel and ensure a conducive working environment for everyone. The lecture titled, #FutureOf Work: The Evolving Work Ethics in the Gen-Z Era focused on recognizing red flags in the workplace; respecting and appreciating diversity of employees; and bridging generational gaps among the workforce. This can be done through promotion of open communication, implement mentorship programs, focus on common goals, flexibility in work arrangements, acknowledge and celebrate differences, provide professional development opportunities, and lead by example. The seminar was attended by officials, personnel, and technical staff of the bureau's four divisions.

institutional updates

Workshops

Validation Workshop for the Process Documentation and Assessment of the Implementation of DA-BAR's ATBI Program

The bureau convened its partner R4D institutions on 6-10 February 2023 at SEARCA headquarters in Los Baños, Laguna to validate the results and analyze its implementation of the ATBI Program. This five-day workshop validated the accuracy of the information gathered, analysis conducted, and recommendations proposed through feedback and suggestions from selected ATBI stakeholders covered by the study; facilitated the integration of comments to the final report of the project; and revised and updated the guidelines of the DA-BAR ATBI Program.

Seminar-workshop disseminates sandfish-based integrated multi trophic aquaculture systems

The Marine Environment and Resources Foundation, Inc., in collaboration with the University of the Philippines Diliman-Marine Science Institute, conducted a feedback seminar and workshop at the Bolinao Marine Laboratory, UP Marine Science Institute on 28-29 September 2023.
Aimed to provide a venue for exchange of information on the current practices and initiatives in sandfish culture and fishery management, the activity was joined by 40 participants from various institutions, organizations, and agencies within Ilocos, Cagayan Valley, and Central Luzon regions. Conducted as part of a research for development project that aim to diversify sustainable sandfish aquaculture production systems and to contribute to the resiliency of small-scale fishers, the activity likewise explored and promoted the feasibility of scaling the sandfish-based integrated multi-trophic aquaculture in northwestern Luzon. The seminar-workshop was also attended by DA-BAR staff led by Julia Lapitan, assistant head of the Project Monitoring, Evaluation and Linkaging Division, Marnelie Subong, technical staff of Program Development Division and documentation team from the Knowledge Management and Information Systems Division.

DA-BAR Grants Manual and Intellectual Property Policy Orientation for R4D partner implementing agencies

In order to have a smooth project implementation of bureau-funded projects, officials and representatives from DA regional field offices, and bureaus and attached agencies; and state universities and colleges gathered for the DA-BAR's grant manual and intellectual property policy and technology transfer protocol orientation in CvSU, Indang, Cavite and Google meet on 15-17 November 2023. The bureau's R4D partner institutions and agencies are encouraged to utilize the mentioned documents to develop, scale up, and ultimately, transfer technologies to farmers and fisherfolk.

Series of presentations on implementing guidelines on the preparation, submission, screening, and evaluation of proposals for strategic, scaling R4D, and institutional development projects and assistance (R4D facilities and human resource development); on monitoring and evaluation; and on knowledge products and R4D project documentation were conducted to disseminate the contents of the manual. A presentation and discussion on DA's IP Policy and Technology Transfer Protocol was also held to define the guidelines, and roles and responsibilities of DA and its attached agencies and bureaus in the ownership, protection and management, utilization, transfer and commercialization of IPs generated from DA-funded R4D programs and projects.

institutional updates

Workshops

Consultation Workshop for the Consolidation and Harmonization of the Agri-Fishery Climate Change R4DE Agenda and Programs 2024-2028

Organized by the DA-BAR, the activity aimed to compile and assess the current status of R4D initiatives and outputs of the various institutions on climate resiliency with the specific focus of identifying the technology gaps, scaling pathways and drafting the harmonized priority R4DE areas for the next medium term. This is in cognizant with the ongoing Climate Change Action Program of the Philippine Government in partnership with the Asian Development Bank aimed to address climate-related challenges and implement national policies to drive transformation in critical sectors, foster climate resilience and reduce carbon emissions. This workshop aimed to serve as a bridge, bringing together the expertise, insights, and perspectives of diverse stakeholders – from research institutions, governmental bodies, non-governmental organizations, to industry leaders and local communities

Experts, key representatives, and climate change team focals convened virtually for a consultation workshop on 15 December 2023 via Google Meet. This synergistic collaboration is in pursuit of crafting policies towards increasing the R4D investments for climate change resiliency of the country's agriculture and fisheries sector.

Technology Readiness Level workshop

DA-BAR conducted a Technology Readiness Level workshop on 18-19 December 2023 to provide strategic insights for improving R4D management specifically in the context of agriculture as well as to assess the maturity of technologies funded by the bureau. This was participated by technical staff from the Program Development Division; KMISD; and the Planning and Monitoring Unit to equip them with a comprehensive understanding of Technology Readiness Level and Investment Readiness, including the associated frameworks.

Developed by The Welding Institute (United Kingdom), the Technology Readiness Level-Innovation Management and its application in agriculture has nine technology readiness levels that is used to estimate the maturity of a particular technology towards full economic operations.

The final output of this workshop is the draft technology readiness policy briefer which will serve as a guide for implementation and eventually, adoption by research partners.

institutional updates

Conferences

2023 International Society for Southeast Asian Agricultural Sciences International Scientific Congress

Key officials and staff participated in the opening and Plenary Scientific Sessions of the International Society for Southeast Asian Agricultural Sciences International Scientific Congress and General Assembly 2023 on 8-10 November at Acacia Hotel Manila, Alabang, Muntinlupa City.

With the theme Integrated Management of Southeast Asian Agricultural Landscapes, the three-day scientific congress featured lectures and scientific discourse covering a vast field of agricultural research.

Benchmarking of the agricultural R4D management system in selected asian countries

Selected BAR officials and staff visited various national government funding institutions (with resemblance to DA-BAR mandate and functions) in Malaysia, Thailand, and South Korea. The visits aim to distill lessons on improving the agricultural research management system. Learning will guide directions for DA-BAR on how to strengthen its capacity in planning, programming, budgeting, and monitoring research programs. Immersion of DA-BAR officials will help foster its human resource development in agricultural research management and thus, improve commitment among officials and staff towards designing better financial management systems.

Led by the SEARCA, this activity aims to assess and analyze the R4D Coordination and Management activities of Asian Agriculture and Fisheries funding institutions (focusing on the grants system). Specifically, it aims to assess the policies and factors affecting the effectiveness and ineffectiveness of the R4D program implementation and management of selected countries; provide recommendations for the adoption of the good practices and policies observed and gathered. An assessment and benchmarking report identifying various factors influencing the effectiveness of R4D program implementation and management and gap analysis report and policy recommendations, including Actionable Operational Policies for BAR's R4D system is expected at the end of the activity.

major activities

National Agriculture and Fisheries Technology Exhibition

DA-BAR anniversary

2023 Sustainable Challenge Award

Gender and Development activities

major activities

National Agriculture and Fisheries Technology Exhibition

The bureau held its first National Agriculture and Fisheries Technology Exhibition simultaneously with the bureau's founding anniversary on 15-17 August 2023 at CLSU, Science City of Muñoz, Nueva Ecija.

Showcasing R4D initiatives and innovative products developed and validated through research, the event served as a platform for technology developers to connect with stakeholders and takers, as well as foster new opportunities. The technologies on display at the exhibit would increase the efficiency, sustainability, and production of Filipino agriculture and fisheries in the region for years to come.










A two-day seminar series was held at the Teacher's Hall, CLSU, and broadcasted live through the bureau's social media accounts. Attended by more than 240 people on average, the topics covered included pest management on mango cecid fly, goat production technology, solar-based hose reel irrigation, off-season onion production, oyster culture using floating bamboo raft, WaterRice in action, and the significance of Food Development Center services to agriculture and fisheries R4D.

Other activities during the three-day celebration included the launching of the CLSU-produced book, InPEELnity: Turning Waste into Things with Good Taste and the National Agricultural and Fisheries Research for Development and Extension Agenda 2023-2028, as well as the recognition of the bureau's loyalty awardees and best performing officials and staff.

major activities

DA-BAR anniversary

The bureau celebrated its 36th founding anniversary with the theme, Shaping Agri-Fisheries Technologies for a Better Future on 15-17 August 2023, at CLSU, Science City of Muñoz, Nueva Ecija.

One of the highlights of the celebration is the recognition of exemplary personnel who have achieved significant milestones, shown competency, and promoted efficiency in the workplace in 2022. The awards were given in the following categories: loyalty, outstanding permanent employees, outstanding contract of service, and special awards, guided by the DA-BAR Program on Awards and Incentives for Service Excellence and the Recognizing Contract of Service Staff for Excellent Service and Satisfaction.

The loyalty awards were granted to Melissa Resma and Elec Yadao, who have been in the bureau for 35 years, while Roberto Quing, Jr. and Ricardo Bernardo were also recognized for their 20 years of service.

Raymond Patrick Cabrera, Cynthia Remedios De Guia, and Marjorie Mosende were awarded the outstanding division head, outstanding assistant division head, and section head, respectively, in the Program Development Division. Melody Memita of the Records Unit-Administrative and Finance Division received the outstanding unit head award, while Glacelle Alyne Malinao was given the outstanding technical support staff award. The bureau also recognized outstanding technical support staff, including Chrystel Venus Fonseca, Apolonia Mendoza, and Chiqui Padullon, and outstanding administrative support staff, including Peter John Cagula, Aiko Monique Del Mundo, and Elmer Gumban.

Special awards were also given to Abelardo de Jesus, Diosdado Dulay, Marc Lawrence Francisco, Andrew Chris Lazaro, Augusto Lesaca, and Renzo Miguel Siao for having the highest attendance. Malinao, Francisco, Arnel Geli, and Maria Ruby Lumongsod were also acknowledged for having the highest attendance to flag ceremonies, while Christopher Lazaro, Rhaine Borres, and Nestor Nebreja were awarded as best performing drivers.

The oath taking of newly-elected officers of the Association of Bureau of Agricultural Research Employees was also held as part of the day's program. The association is duly registered and recognized by the Department of Labor and Employment and the Civil Service Commission. It has 48 regular members and 33 affiliate members, presently.


AWARDS
NIGHT
AGRICULTURE
POTTERY
IN THE PHILIPPINES


LOYALTY

major activities

2023 Sustainable Challenge Award

Aimed to recognize the notable R4D interventions exemplifying technology utilization, adoption, and sustainability outcomes, the bureau conducted the Sustainable Challenge Award participated by R4D implementing agencies and farming and fishing communities in the country.

DA-Cagayan Valley's Pinoy GourMix bagged the first place, receiving a plaque of recognition, a cash prize of PhP 70,000, and a research grant to further upscale and expand their technology-based assistance to the communities.

DA-Western Visayas' Production and Technology Promotion of Batuan, UPLB's Stingless Bee Enterprise Development for Lanao del Norte, DA-Caraga's Strengthening and Sustaining Soybean Industry in the Region, and DA-NFRDI's Enhanced Tilapia Fingerling Production in Village-level Farms in Laguna and Batangas were recognized as second to fifth places, respectively. They also received plaques of recognition, cash prizes according to their ranking, and a research grant.

The panel of judges evaluated entries based on the Scope and Level of Adoption of Technologies, Improvement of Productivity and Profitability of the Community, Empowerment of the Community toward Sustainable Development, and Video Documentation.

major activities

Gender and Development activities

As part of the bureau's Gender and Development program, the bureau organized two related events in 2023. The National Women's Month in March and the 18-Day Campaign to End Violence Against Women in December.

The theme, 'WE for gender equality and inclusive society,' highlights the collaborative efforts required from all genders to achieve this objective, designated by PCW from 2023 to 2028.

Series of activities were lined up during the National Women's Month of the bureau. The Women's Month exhibit showcased women-partners of DA-BAR funded programs and projects. Part of the exhibit was the HERbook, an interactive board for staff to share their thoughts on this year's women's month celebration.

Other activities include an online seminar for stakeholders titled, Corn Open-Pollinated Varieties and the Women behind Café Bagga. Two seminars for staff titled,'Gender Sensitivity in the Workplace and Gender-responsive Agriculture and Fisheries Research were also organized. Staff members are also encouraged to participate in #PurpleWednesdays by wearing purple shirts in support of the PCW campaign.

For the 18-Day Campaign to End Violence Against Women, the bureau conducted a hybrid seminar on 12 December 2023. Atty. Kristy Jane M. Balino served as the resource speaker. She emphasized the importance of cultivating awareness and understanding of women's violence to actively reduce its prevalence in society.

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