



2020

ANNUAL REPORT

Elevated R4D response for resilient agriculture and fishery food systems amid the pandemic



The **Bureau of Agricultural Research** is a staff bureau of the Department of Agriculture (DA) tasked to coordinate agriculture and fishery Research and Development and ensure the application of its full potential to improving the sector.

It was created in 1987 through Executive Order 116 to ensure that agricultural research is coordinated and undertaken for maximum utility to agriculture.

The bureau is mandated to tap farmers, farmers' organizations, and research institutions, including state universities and colleges in the conduct of research for the use of the DA particularly, the farmers and fishers.

Vision

The Department of Agriculture-Bureau of Agricultural Research is the lead Research for Development coordinating agency towards a technology-empowered agriculture and fishery sector contributory to inclusive growth.

Mission

We coordinate, integrate, and manage the Research for Development system to ensure its optimum utility for the agriculture and fishery sector.

Values

Integrity, Accountability, Commitment, Professionalism, and Innovation

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Message from the Director

Dr. Vivencio R. Mamaril

2020 was supposed to be visionary. It is the end of another century after all and even as it started, it has brought the most challenging crises.

The eruption of Taal Volcano damaged the agriculture sector in the provinces of Cavite, Laguna, and Batangas. After this natural calamity, African swine fever was detected and ravaged the hog industry. And as the first quarter of the 2020 ends, the Philippines declared that COVID-19 has now reached a pandemic proportion.

Admittedly, agriculture is one of the sectors that has been greatly affected by all of these events. And on this occasion, the Department of Agriculture (DA) recognized that the threat of the dreaded virus is the same as the threat of having no food. Because of this, DA launched the Plant, Plant, Plant Program that will ensure the availability and accessibility of food for every Filipino.

With that, we are honored to present the 2020 Annual Report of the DA-Bureau of Agricultural Research (BAR). This is a compilation of the bureau's accomplishments and fund utilization brought by the collective efforts of scientists, researchers, and farmers in the field. This allows the Filipino people to see in full detail how we

strive to be of service especially in these trying times.

DA-BAR amidst pandemic

Led by our Agriculture Secretary William “Manong Willy” Dar, DA’s ‘New Thinking’ paradigm was crafted during the pandemic. It focused greatly on the prioritization of food production, and security, and visioning a food-secure Philippines with prosperous farmers and fisherfolk.

DA has three core strategies wherein most of the programs and activities revolve: 1) **Survival** that focuses on resiliency projects and risk management; 2) **Reboot** that considers the accelerated implementation of the strategies and; 3) **Grow** that aims to increase partnership with agencies and private sectors.

So, to further strengthen the strategies, DA-BAR anchored and refocused portion of its budget, as well as re-aligned some of its projects in response to the effects brought by the pandemic; hence, the birth of the DA-BAR **Resiliency Response Research** for Development Program (otherwise known as the 3R Program).

This program focused on the upscaling of mature and relevant technologies wherein research for development (R4D), in this context, would serve

as a major tool in achieving a more inclusive agribusiness orientation. The 3R program has five guiding strategies.

These are: 1) **Expanded Production and Post-Production Support**; 2) **Intensified Farming Systems under an Inclusive Market-Oriented Agri-Business Orientation**; 3) **Expanded Food Products and Technology Upscaling**; 4) **Sustained Support for Upgrading of R4D Capacities**; and 5) **Digitalizing Agriculture R4D**.

The projects under these strategies are immediately rolled out and continuously, we see to it that their operations are rationalized for greater efficiency and effectivity. We, at DA-BAR, believe that the strategic adjustments made through 3R are not just applicable to our current situation. We want to ensure that this program has potential impacts that can be channeled to a lot of Filipinos especially if operationalized over time.

DA-BAR R4D Programs

DA-BAR has been committed to delivering results from various projects under the different programs. So, the bureau’s commodity, and thematic programs continue their implementation alongside the emerging 3R program.

Commodity Industry-based R4D Programs

The commodity industry-based R4D programs include the implementation of activities under rice, corn and cassava, high-value crops, livestock, and capture fisheries and aquaculture. Under these programs, different projects are administered that specialize in improving product competitiveness, accessibility, and productivity.

The projects under these programs forward the goal of capacitating farmers and fisherfolk to empower them for better quality of life. These projects show great potential in strengthening strategies, promotion of different commodities not limited to staple agricultural products, and market exploration that can eventually lead to achieving food security.

Considering our ongoing crisis, DA-BAR felt the need to elevate the support on these initiatives because not only this can be of great benefit to farmers but also can be a course of action to maintain the collaboration and alliance among partner agencies.

Thematic R4D Programs

The Thematic R4D programs of DA-BAR include organic agriculture, climate change, and biotechnology. The projects under

these programs promote sustainability and enhancement on crop and animal productions; adaptation and mitigation on the adverse effects of climate change; and building innovations on plant and animal breeding.

Through collaboration with different R4D institutions and stakeholders, the formulation of plans and strategies under these programs were further enhanced to create a viable farming method that can ensure crop stability and safer produce consumption for the farmers and consumers. Apart from that, these programs also became an avenue for farmers and fisherfolk to have access to modern tools and practices that can aid in alleviating their operations.

The bureau was tasked to be at the forefront in coordinating initiatives like these. And with the global phenomenon that risks health and livelihood, DA-BAR commits to continue being one of the pillars and foundation of promoting innovations and solutions.

Institutional R4D Support Services

Apart from supporting projects, DA-BAR offers grants to students, researchers, and scientists to continue their contribution to the department's pool of knowledge. In 2020, the bureau assisted degree scholarships, and facilitated the

evaluation and endorsement of scientists. Apart from that, DA-BAR also helped in upgrading different establishments and laboratories concerning agri-fishery R4D.

And while all these pursuits continue, the bureau was also expanding its network by connecting and strengthening its partnerships and linkages with national and regional offices, including international organizations that share the same passion and advocacy. Through these, strategies were well-aligned with the department's goal of making the implementation of activities more harmonized and coordinated. Seeing its contribution in the sector made DA-BAR believe that it can highly contribute to the economy and most especially in the lives of farmers and fisherfolk. Thus, the bureau provides funding support to various R4D projects in collaboration with partner institutions and implementing agencies.

We believe that all of these programs launched and accomplished featured in this 2020 Annual Report are proof of the Filipinos' sustained *bayanihan*. It greatly shows that our concerted efforts can drive our actions towards success. Thus, we extend our appreciation to all our partners who never ceases to do research with the objective of helping our farmers and fishers

improve their quality of life and even supported us in overcoming the many challenges we encountered this year. And to which despite limitations on implementation, some projects have received notable awards. Your minds and expertise hold the fundamental answers towards greatness. Never stop contributing.

To the DA-BAR staff, for all the relentless efforts and dedication in serving the bureau and the Filipino people, I would like to express my gratitude to you all. I have seen you go the extra mile and as always, you deliver results for our farmers and fisherfolk. Never lose that passion.

As a testament in ensuring efficient fund management, DA-BAR, under the Big Accounts Category, was awarded during the Year-End Financial Evaluation and Assessment for 2020 for the accurate recording and updating of the bureau's 2019 financial transactions for fund transfer monitoring.

Lastly, to our farmers and fisherfolk, your contribution to this industry is greatly valued. We assure you that, as our ultimate beneficiaries, we are here because of you. We will continue striving for continuous and better partnership.

Thank you and *mabuhay!*

2020 Financial Overview

PHP 817,964,900.00

total funds received from the 2020 General Appropriations Act in support to the bureau's operations and programs, activities, and projects

99%

PHP 816,201,396.34

*total amount of **obligations** incurred and committed to be paid by the bureau from the total fund allotment*

98%

PHP 806,784,375.22

*total amount of funds **disbursed** by the bureau as payment for the obligated fund allotment*

NATIONAL RICE PROGRAM

includes basic and applied researches, CPAR rice-based researches, and related IEC materials and activities

309,679,000.00
309,678,393.74
309,678,393.74



73 PROJECTS (27%)



NATIONAL ORGANIC AGRICULTURE PROGRAM

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

45,721,000.00
45,691,921.21
42,367,340.51



18 PROJECTS (7%)





VARIOUS RESEARCH AND DEVELOPMENT

includes allocated funds under DA-BAR's AFMA funds for CPAR, NTCP, RFDG, livestock and poultry, fisheries and aquaculture, climate change, policy researches, and scholarship grants



55 PROJECTS (20%)



NATIONAL CORN PROGRAM

includes corn, cassava, and sorghum basic and applied researches, and NTCP and CPAR corn, cassava, and sorghum researches

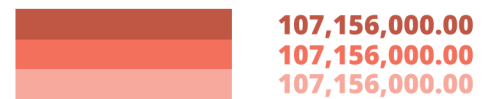


31 PROJECTS (11%)



HIGH VALUE CROPS DEVELOPMENT PROGRAM

includes basic and applied researches and NTCP high value crops-based researches

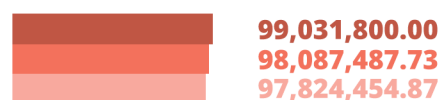


62 PROJECTS (23%)



BIOTECHNOLOGY PROGRAM

includes allocated funds under DA-BAR's AFMA funds for basic researches on biotechnology



31 PROJECTS (11%)



Rice

Something special about rice

Having unique traits on aroma, stickiness, and kernel color from the ordinary white rice counterpart, the Philippine specialty rice is known for its grain quality characteristics, high market value, and health-promoting properties. It shows great potential in the export market and could also boost the overall rice industry.

Comparing the local and international specialty rice, analysis showed that the former has competitive advantage in terms of productivity and profitability. However, a lot must still be improved in terms of local processing, packaging, accessibility, and marketing.

As such, implemented by DA-PhilRice, the project helped in addressing the low income of rice-farming households and the limited options of farmers in value-adding by providing in-depth information about the status and market potential of Philippine specialty rice. Among its impacts include improved profitability of specialty rice, better accessibility and availability of specialty rice to consumers, maintenance of the cultural significance of the specialty rice, and higher price of specialty rice compared to ordinary white rice.



PHOTOS COURTESY OF DA-PHILRICE

www.pinoyrice.com/palaycheck/ 



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PalayCheck SYSTEM FOR THE PHILIPPINE IRRIGATED LOWLAND RICE

PalayCheck is a dynamic rice crop management system that:

- Presents the best key technology and management practices as Key Checks,
- Compares farmer practices with the best practices, and
- Learns through farmers discussion group to sustain improvement in productivity, profitability, and environment safety.

PalayCheck is simply
**LEARNING
CHECKING
SHARING**
for best farming practice.

PRINCIPLES OF PALAYCHECK

IMPLEMENTING PALAYCHECK

STRATEGY

CONTACT US | PHILRICE TEXT CENTER: (433) 917-111-7423
DEPARTMENT OF AGRICULTURE | PHILIPPINE RICE RESEARCH INSTITUTE

Rice Crop Manager and Palaycheck System

Rice Crop Manager provides customized crop and nutrient management guidelines for specific growing conditions based on farmer's needs.

While, Palaycheck System presents key technology and management practices through comparison of farmer practices for a sustained overall improvement in productivity, profitability, and environment safety.

The use of the two technologies developed by DA-PhilRice, along with the integration of mung bean, squash, and string beans to rice production, yielded 23.90 percent and 4.51 percent production increase during the wet and dry seasons, respectively, over farmers' practice.

Focused pest and diseases



Leaf and Rice blast



Brown planthopper



Rice Tungro Disease brought
by Green Leafhopper



Whitehead



Rats

PHOTOS COURTESY OF DA-PHILRICE

PRIME in its prime

Pest Risk Identification and Management (PRIME) continues to be a capacity-strengthening collaborative project among IRRI, DA-PhilRice, and DA-BPI. It aimed to understand risk factors for local pest and disease outbreaks such as leaf and Rice blast (*Pyricularia oryzae* Cavara), Bacterial Leaf Blight (*Xanthomonas oryzae* pv. *Oryzae*), Brown Planthopper (*Nilaparvata lugens*), Rats (*Rattus argentiventer*), and Rice Tungro Disease brought by Green Leafhopper (*Nephotettix virescens*)—to which weather-based and preliminary pest risk models were developed and improved.

Some of the results showed that the mathematical simulation model was developed for tungro epidemics, while greenhouse experimentation was conducted to measure the presence of brown planthopper. Further, density method was also applied to measure rodent population—to which these management strategies, which aimed to reduce major crop losses caused by pest incidences, were specifically identified in regions like Central Luzon, CALABARZON, Bicol, Western Visayas, Caraga, and Davao.

During the months of April, May, and June—417, 881, and 1,647 fields were surveyed, respectively, despite the pandemic situation. New version of pre-season and within season bulletins, which included pest advisories and recommendations, were also shared to regional partners. Meanwhile, four versions of the PRIME Collect application for rice pest surveillance could be accessed through the developed PRIME web portal.

The project also sponsored six livestream sessions of PalayAralan seminar series via DA-PhilRice Facebook page. After monitoring 2,498 rice fields, a total of 350 copies of the Rice Pest Surveillance Manual were printed. To facilitate the usage of pest risk models, a graphical user interface was also developed.

Lastly, preliminary analyses using satellite images and field survey data were conducted, while field data from Philippine Rice Information System (PRISM) and PRIME pest surveillance which include field geolocation and boundary for 2018-2020 were consolidated.



PRIME Event

National PRIME Annual Assessment Workshop

The PRIME Project conducts NPAA annually to properly report the progress of the PRIME project activities and to assess the current technical and functional capacity of project partners. Issues and future plans for each region are also discussed in this workshop.

- Cluster 1: 9 November 2020 | Regions CAR, I, II, III and V
 - Cluster 2: 11 November 2020 | Regions IV-A, MIMAROPA, VI, VII and VIII
 - Cluster 3: 13 November 2020 | Regions IX, X, XI, XII and XIII
- 9:00 am to 12 nn Online via Google Meet



[Find out more](#)

ABOUT PRIME

Pest Risk Identification and Management (PRIME) is a four-year project among the International Rice Research Institute (IRRI), Philippine Rice Research Institute (PhilRice), and the Bureau of Plant Industry (BPI) that aims to understand risk factors for pest outbreaks and identify appropriate management strategies and tactics to reduce crop losses. Five pests, which caused major crop losses in the Philippines, will be studied: blast (leaf and neck blast), bacterial leaf blight (BLB), rice tungro disease/ green leafhopper (GLH), brown planthopper (BPH) and rats.

[Find out more](#)



PHOTO COURTESY OF DA-PHILRICE

Cassava



NSIC CV 23



NSIC CV 24

PHOTOS COURTESY OF VSU

New cassava varieties resistant to red spider mite (*Tetranychus kanzawai* Kishida)

NSIC CV 23 and 24 exhibited resistance to cassava red spider mite which offers sustainable and eco-friendly pest control solution to the serious acarine problem in cassava. Several plantations have suffered from red spider mite infestation, especially during the dry season, causing yield loss and reduced starch content.

Further, the use of mite-resistant varieties is deemed practical and economical, and for pest control. Such varieties developed by VSU are also compatible in all control measures applicable to cassava production.

NSIC CV 23 and 24 will be recommended for mass production to be distributed to different users in support to the country's cassava industry. These varieties can be sourced at VSU.

Greenhouse solar dryer for food safe cassava products

A solar dryer was developed by DA-PhilMech to protect cassava products from insects, birds, and animals, as well as dust and other contaminants, and to minimize operating costs of processing.

It utilizes biomass energy for heating the dryer, especially during prolonged rainy periods to maintain good quality dried cassava.

Cassava Growers and Processors Association (CAGAPA), a group of farmers, housewives, and unemployed individuals in Zamboanga del Norte, previously used exposed wooden drying tables. With the solar dryer, the drying process was reduced by 40 percent, while still passing the set FDA standard.

The investment will be recovered in just 1.54 years and would generate an NPV of PhP 7,449,195.59 with an IRR of 66.61 percent and BCR of 4.22.

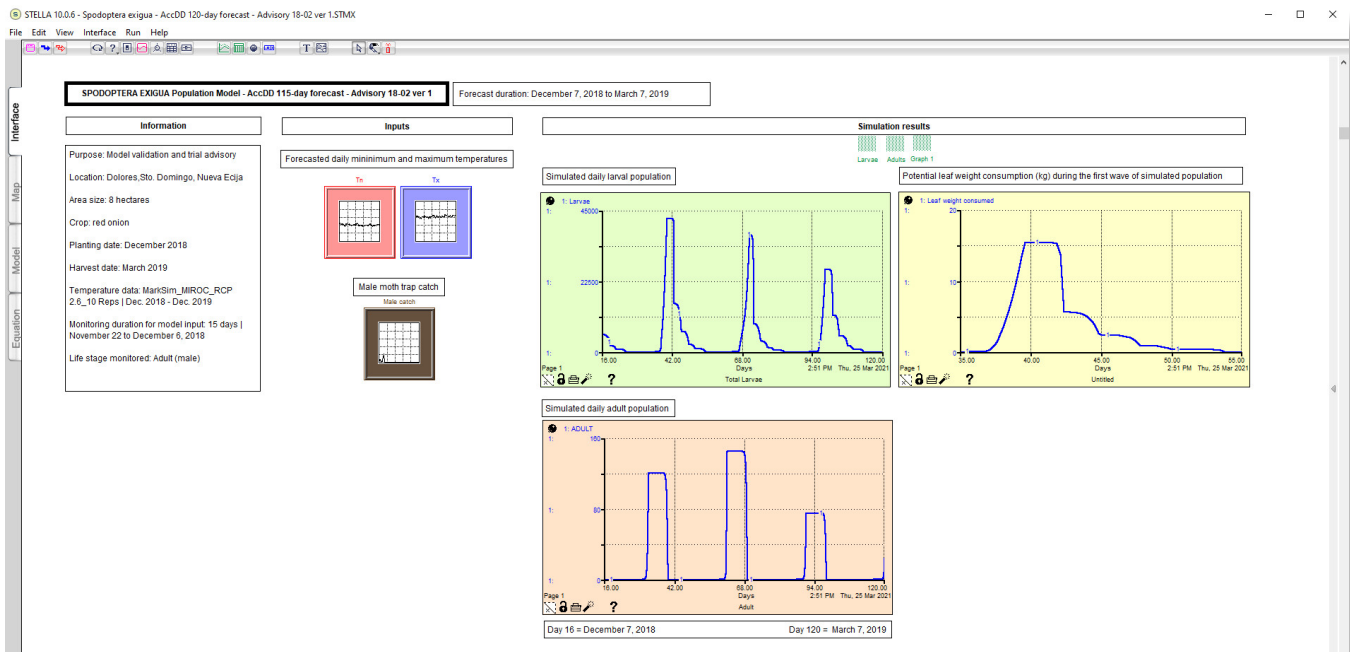


High-Value Crops

Farm-level harabas monitoring and advisory system (HarMoniA)

HarMoniA is an onion armyworm monitoring protocol specifically designed to generate area-specific early warning advisories. The simulation model takes into account the local weather forecast data, basic onion armyworm biology data, historical data, presence of alternate hosts, and other pertinent information. This will generate timely and precise advisory to aid in effectively manage the onion armyworm infestation.

NCPC-UPLB and East West Seed Co. are working to migrate the onion armyworm forecasting model to a web-based platform where stakeholders can receive population forecasts. The former is also planning to establish a precision crop protection laboratory where onion armyworm forecasting system will be further developed, maintained, and updated.



Screenshot of the model interface run through STELLA software

Botanicals and microbials against onion armyworm

Neem, Bioflash (Zamboanga del Sur farmer's concoction), Aztron and Halt (biological insecticide), *Metarhizium anisopliae* (entomopathogenic fungi), Nucleopolyhedrovirus, smoke vinegar, and Koketsu accompanied with pheromone traps were found effective in managing onion armyworm and other Lepidopterous pests in laboratory and field trials.

Farmer partners who participated in the field trials adopted the management strategy because it was proven effective.

Fifteen seminars and training participated by 648 farmers were conducted by NCPC-UPLB to disseminate the research results.

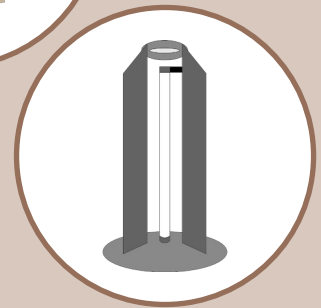
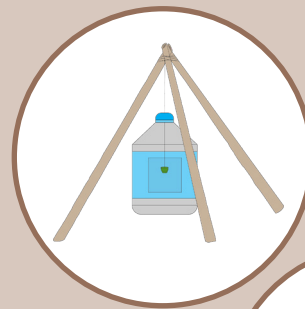
Other complementary ways to manage *harabas*

Setting up traps

Sex pheromone trap lures male moths while white UV light attracts both sexes preventing the growth of the population at the onset.

Using pesticides judiciously

Following the recommended rates for insecticides and alternating those with different modes of actions prevent insecticide resistance, thereby effectively controlling the population.



Soiless agriculture through hydroponics and aquaponics

Hydroponics and aquaponics, dubbed as soiless agriculture, were introduced as a vegetable growing technology in the Philippines. These technologies were promoted by establishing a demonstration farm utilizing pressurized irrigation and greenhouse technologies.

Using locally available materials, the systems and structures of these technologies can easily be established. Thus, providing an accessible source of safer, cleaner, and more nutritious food for Filipino families. The research team fabricated various models and displayed for various stakeholders to learn and duplicate.

Not only in Ilocos region, CLSU has conducted training-workshops locally and internationally. The said technologies were introduced and promoted to farmers and even hobbyists.

Cost and return analysis of different CLSU hydroponic modules for different crops

	TYPES OF MODULES			
	One-sq.m Vertical Garden	Household	Backyard	Commercial
Crop	Lettuce	Kale	Sweet Basil	Cherry Tomato
Total Costs (in PhP)	34,688.80	138,684.06	237,418.10	335,987.31
Net Income (in PhP)	8,827.20	70,055.94	145,981.90	155,412.69

The continuous promotion and implementation of hydroponics and aquaponics technologies in the country are considered an added mechanism to aid the vegetable industry, specifically in arid regions like Ilocos with longer dry season compared to wet season. A number of commercial users have adopted the technologies.



PHOTO COURTESY OF CLSU

Enhanced cacao technologies and products

Considering the nutritional, health, and economic benefits of cacao, various developed technologies were enhanced by ISU-Echague Campus, along with development of a variety of value-added products, towards assuring a sustainable enterprise.

Newly developed and patented cacao products have persuaded cacao farmers and stakeholders to practice value-adding instead of selling dried beans. Motivated adopters increased to form Cacao Growers Associations and cooperatives.

To upscale and increase the adoption and promotion of mature cacao technologies in Cagayan Valley region, ISU entered into a Technology Licensing and Confidentiality Agreement with Beacon Cacao Agricultural Development Corporation, Nicolas Integrated Farm, and Isabela Cacao Farmers Association.



PHOTO COURTESY OF ISU-CVDC



Cacao production POTs

Rehabilitation methods such as pruning and grafting, coupled with GAP that includes proper nutrient management and integrated pest and disease management, paved way for a 26 percent and 92 percent increase in cacao production of Brgys. Subasta and Sirib, Davao, respectively.

Thirty farmer-cooperators who graduated from the training and seminars conducted by DA-Davao Region were tasked to double their number; thus, training 60 more farmers in the community.

A Farmer Field School now operates in the community which greatly contributed to the increase in farmers' productivity and profitability.

Quality traditional sweet potato planting materials*

Eleven traditional sweet potato Batanes cultivars, namely, *Naypitang*, *Naygustin*, *Rosemarie*, *Samorangan (Yayung)*, *Merlin*, *Kabuko*, *Bayat-Uyugan*, *Villuga*, *Dabuhbuhan*, *Mariñas*, and *Nila* are being propagated on-station at DA-Cagayan Valley-Batanes Experimental Station.

Six techno-demo farms were established from August to December 2020 to secure the collection and availability of germplasm and showcase the developed POT. An initial 99,257 cuttings were distributed to techno-demo farms and 271,009 vine cuttings on-farm.

Seventy-eight sweet potato farmer partners and beneficiaries from Basco, Pana, and Itbayat, Batanes were identified cultivating a production area of 30,485 sq.m. They are capacitated to help increase both their production and income.

Farmer partners prefer the *Naypitang* and *Dabuhbuhan* because these varieties yield more tubers, taste better, and are preferred by local consumers.

The low production of sweet potato in Batanes is mainly due to the conventional farming practices of the farmers. With the POT on macropropagation of traditional sweet potato varieties from vine cuttings and recommended farm management and practices for sweet potato, it can contribute to ensuring the sustainable supply of quality planting materials and thus yield.



Naypitang

Foliage Leaf Color: predominantly green, with green and purple periole pigmentation

Leaf Shape: Five deep elliptic leaf lobe, and all veins are partially purple

Vine Pigmentation: predominantly green with purple spotting, green base and node, purple tip which is sparse in pubescence

Storage Root: predominantly red, that gets intermediate during intensity

Storage Root Flesh Color: predominantly pale orange with broad ring of cream in cortex



Dabuhbuhan

Foliage Leaf Color: green with purple veins in surface

Leaf Shape: One triangular toothed leaf lobe

Vine Pigmentation: mostly or totally purple base and node, and green tip which is moderate in pubescence

* ongoing project

PHOTOS COURTESY OF DA-CAGAYAN VALLEY-BATANES EXPERIMENTAL STATION

Off-season onion*

Off-season onion production commanded better price during the last quarter of 2020, ranging from PhP 70 to 100 per kilogram, as reported by DA-Cagayan Valley.

Planting of Super Pinoy variety for off-season onion production from August to September 2020 and harvesting from December 2020 to January 2021, with the provision of rain shelter as a protective covering and use of *Trichoderma* for the prevention of Twister disease, gained positive results.

An average yield of 1.31 metric tons per 1,000 sq.m was attained using said interventions. Given the higher price during the off-season, an average net income of PhP 585,659.13 per hectare (PhP 58,565.91 per 1,000 sq.m) or a 117 percent increase was reported.

A 2.5-hectare land was established as an off-season onion production area capacitating 100 farmers in Aritao and Bagabag, Nueva Vizcaya.

The introduction of POTs which include soil tillage, raised beds, rain shelter, solarization, and nutrient and pest management were integrated into the production following the best cultural management practices of the farmers. The project is geared towards sustainable production and an accessible source of quality planting materials even during the off-season.

* ongoing project



Upscaling Pinoy GOURmix*

Mass production of Pinoy GOURmix product developed by DA-Cagayan Valley creates a growing interest to farmer producers and stakeholders in transforming raw materials into primary products like grits, powder, etc. Since becoming partner cooperators, the additional 26 farmers are ensured of additional income.

Another partner processor, the PROVIDER Multi-purpose Cooperative, yielded an increase in the production of 10,000-20,000 packs per month (maximum of 50,000 packs), depending on the requirement of partner government and private institutions.

The cooperative helped in marketing the product and further promoted the consumption of affordable and nutritious food to feed the underprivileged and undernourished.

With its high nutritional benefits, Pinoy GOURmix is suitable for feeding programs and as relief food.





Chevon-based products improved

Four chevon products, namely: *papaitan*, *kapukan*, jerky, and *tapa*, were reformulated, stabilized, and packaged in order to produce an intermediate moisture processed meat.

CLSU worked on product optimization based on consumer's needs adding value to chevon for local consumption and export. Products were scaled-up from laboratory prototype of 20 to 40 kilograms of raw meat to provide different production level options to possible adopters. For a 20-kilogram production, *papaitan* was recorded with the highest net income of PhP 4,297.37.

Goat raisers were trained on chevon processing POTs. With a fixed capital investment of PhP 2,248,649. ROI is marked at 26.61 percent with a payback period of two years, eight months, and two days.

Green corn-based silage POTs

ISU-Echague Campus developed a POT for green corn to improve milk production and increase the income of dairy farmers in Cagayan Valley through the silage, haylage, and UMMB using locally available feed resources.

Study revealed that producing green corn and ensiling it to produce green corn silage preserves and prolongs the storage life of forages.

Results showed increase in milk production from two to four liters for buffalo and four to 10 liters for cattle.

Profitability and viability analysis showed that:

- planting corn for silage is more profitable than producing corn for grain by PhP 56,500 (per year);
- producing green corn silage is more profitable than selling green corn for silage by PhP 345,195; and,
- feeding green corn silage + supplements increased income from milk production¹ from PhP 28,155 (per year) to PhP 71,185.

In the long-term, all enterprises were viable.

Two partner dairy cooperatives benefitted from the project wherein they also attended personal entrepreneurial trainings, as well as mentoring workshops on production, processing, packaging, and storage of green corn silage for dairy cattle and buffalo POTs.



PHOTO COURTESY OF ISU

¹ Using figures from cattle production



PHOTO COURTESY OF SLSU-JGE

Market study of native pig products

SLSU-JGE study suggests that sustainability for raw materials for processing can be assured through expanded native pig production and propagation among project partners and potential collaborators benefiting from dispersal activity.

Production of native pork products such as *lechon*, *tapa*, *tocino* and *longganisa*, and patties (with herbs), bottled Spanish style, and *lechon paksiw* were recommended for additional income of the farmers-cooperators. Native pork *longganisa*, the most preferred product, shows indications of gaining high marketability.

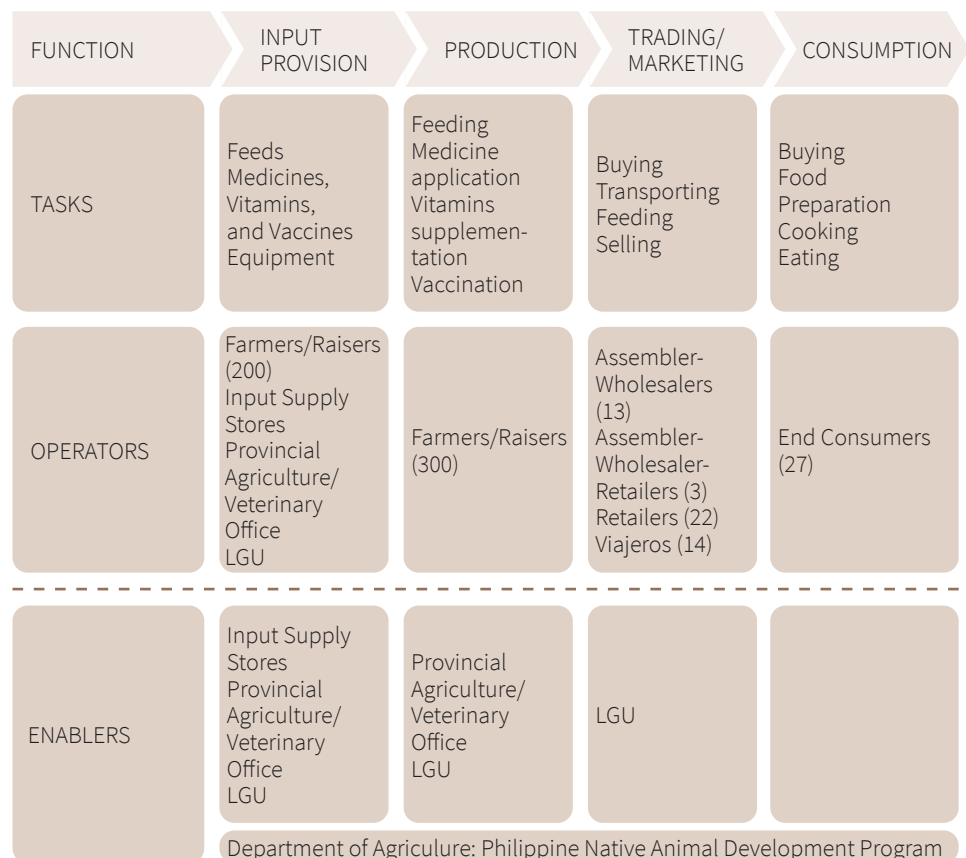
Aside from proper packaging and labelling, the study advised to establish food standard-compliant processing building.

Supply value chain analysis of native chicken

The value chain framework analyzed the structure and dynamics of the supply chain of native chicken in Batangas and Quezon.

The study also covered production and practices of native chicken, cost and return analysis, technical efficiency analysis, description of key players, value chain map, product and geographic flows, marketing efficiency, price structure, markets and market opportunities, interfirm relationships, logistic requirements on the production and marketing of native chicken, support services, and problems and issues on upgrading strategies.

Supply Value Chain Map of Native Chicken in Batangas, Philippines



Capture Fisheries and Aquaculture



PHOTOS COURTESY OF DA-BFAR CAR

Enhanced POTs for tilapia fry/fingerling production*

The POTs on modified intensive tilapia hatchery and fry rearing of tilapia to advanced fingerling stage were outscaled and adopted through five series of training conducted.

DA-NFRDI and DA-BFAR-National Freshwater Fisheries Technology Center have intensified the dissemination and adoption of suitable site-specific hatchery and nursery POTs in support to the production of Nile tilapia (*Oreochromis niloticus*) fry and fingerlings with emphasis on efficient breeding methods, appropriate feeding, and water management with a 30 to 40 percent increased (hatchery and fry) production, faster growth rate and 80 percent survival rate.

The project has identified seven hatchery and 11 nursery cooperators in Ilocos region, Cagayan Valley, Central Luzon, and CALABARZON.

The project promotes the adoption of POTs for seed production of tilapia to address the needs of the aquaculture industry for a continuous supply of good quality seed stock in village-level grow-out ponds and cages. The improved protocols are expected to increase seed production at a sustainable level and thereby, increase the income of the fisherfolk.

* ongoing project

Improved milkfish hatchery and nursery protocol*

The DA-NFRDI promotes the adoption of enhanced protocols for hatchery production of milkfish in Quezon province using efficient feeding and water management for faster growth and higher survival rate.

The feeding management involves strict attention to the provision of the appropriate density of natural live food for the fry while maintaining optimum water quality through proper water management using filtered and/or treated water.

Nursery rearing protocols involve the growth of natural food and feeding with commercial diets to maximize stocking density in the rearing ponds.

Through the project, three village-level hatchery farms were linked with 35 nursery farms, producing 630,000-740,000 fry per cycle per hatchery cooperator with a 37.6 percent survival rate.

Nursery rearing protocol is expected to increase the productivity of hatcheries and nurseries at a sustainable level of production, and increase the income of fisherfolk.

The promotion of the technology through the village-level strategy would ensure the availability of the needed fingerling for stocking to grow-out ponds in the local aquaculture community.

* ongoing project



Milkfish fry



Milkfish fingerlings

PHOTOS COURTESY OF DA-NFRDI



Stock enhancement of Blue Swimming Crab (BSC)*

Improved and disseminated protocol for hatchery production and stock enhancement program for BSC was measured through market production and catch-based assessment.

Using the POT, 44,000 crablets are produced per cycle with a 25 percent survival rate. A 10 percent increase in the production was achieved by 25 crab fisher beneficiaries who were linked to five local markets.

The DA-BFAR Eastern Visayas' stock enhancement program and improved hatchery operations of the BSC aim to increase production of good quality crablets that will be released in their natural habitat. This will subsequently increase the crab population resulting in improved Catch Per Unit Effort, increase income with sustainable management and utilization of the crabs, and reinforce the existing laws and ordinances on the minimum size of crabs for collection.



PHOTOS COURTESY OF DA-NFRDI-MFRDC

* ongoing project



PHOTO COURTESY OF DA-BFAR ILOCOS REGION

Site-specific protocols for Red Tilapia*

Site-specific protocol on the grow-out culture for the optimum growth of red tilapia (*Oreochromis niloticus* x *O. mossambicus* strain) in brackish water, and freshwater ponds and cages in various agroclimatic conditions in Luzon were established by DA-BFAR Cordillera Autonomous Region, Ilocos region, Cagayan Valley, Central Luzon, and Bicol region based on SEAFDEC Manual for Tilapia Culture.

The projects identified 250 beneficiaries in 18 sites in Luzon. DA-BFAR Bicol region conducted postharvest and processing techniques to promote red tilapia within the locality, and donated fresh and processed harvest to frontliners in the COVID-19 stricken areas.

The developed module and handbook for grow-out culture technology of red tilapia will not only serve as a guide for livelihood option for small-scale fish farmers in Luzon but also promote this high-end commodity to expensive restaurants and markets.

* ongoing project

Organic Agriculture

Antibiotic Degrading Microorganism (ADM) for organic fertilizer production

ADM is a promising treatment technology developed to break down antibiotics in animal manure. Reduction or total elimination of antibiotics to acceptable levels² will result in the production of safe and quality organic fertilizer.

ADM hastens the decomposition of harmful antibiotics in animal manure collected from commercial farms, thereby addressing the concerns of contamination in the raw materials (manure) used in the production of organic fertilizer.

CLSU has identified two effective ADMs, *Aspergillus flavus* and *Aspergillus niger*, that were used as bio-inoculant during composting to remove tylosin and oxytetracycline, the target antibiotics in chicken manure. Both ADMs can easily be mass produced using various agricultural wastes as substrates. Further, compost produced from bio-inoculant induced composting have better NPK value of 7.02 due to high content of chicken manure.

Upon elimination of antibiotics from animal manure and proper decomposition protocols², farmers can shorten the time needed to process the animal manure before it can be mixed with other ingredients.

² based on the Philippine National Standards for Organic Soil Amendments or PNS/BAFS 183:2020 ICS 65.080



Integrated organic farming

Farmer-cooperators from Kalayaan, Laguna were introduced to the integrated organic vegetable production. They were provided with farming kits, inputs, and tools for the establishment of their organic production areas.

Technical trainings and seminars focusing on developed POTs further aimed to increase the number of farmers practicing organic agriculture and help them increase their income.

They were also taught to produce vermicompost as inputs for the production of chemical-free lettuce, chili, and cucumber; and rear native chicken and swine coupled with meat processing.

CELPA, Inc., project proponent, established a market between farmers and non-government organizations who are into organic farming as a means of growing safe and high quality agriculture produce.

The use of organic inputs (i.e., vermicompost) in place of chemical alternatives helps in improving the soil organic matter and overall quality. Organic farming ensures that the production of crops, poultry, and livestock is more sustainable and safer for both producers and consumers.



PHOTOS COURTESY OF CELPA, INC.

Climate Change



Sloping Agricultural Land Technology



Climate-resilient agricultural (CRA) technologies and practices

DA-CALABARZON piloted CRA technologies and practices in San Francisco and Guinyangan, Quezon. These two municipalities have high vulnerability index among the municipalities in Quezon based on the results of the Climate Risks and Vulnerability Assessments conducted.

The CRA technologies and practices introduced to the rice farmers against drought are the use of stress-tolerant varieties, provision of irrigation system, rainwater harvesting, planting of legumes after rice during dry season, and planting of trees around borders to serve as breaker during strong wind.

To help combat drought, the corn farmers were given CRA options on corn-based cropping system with purple yam, sweet potato and vegetables; intercropping with legumes; and use of improved corn varieties. Meanwhile, the Sloping Agricultural Land Technology, agroforestry, and intercropping with legumes and crop rotation were taught to the farmers to lessen the effects during heavy rains.

Further, the farmers in Western Visayas region were introduced to the use of stress-tolerant rice varieties, system for rice intensification, *babuyang walang amoy* production, native pig production, and water harvesting to adapt to the impacts of climate change.

The promising results of these projects in pilot villages of CALABARZON and Western Visayas regions have been considered for scaling up in other areas with similar agricultural profiles.



PHOTO COURTESY OF DA-BIOTECH-PIU

Protein genes in water buffaloes and goats as potential source of susceptibility or resistance to subclinical form of mastitis

Mastitis is a deleterious udder disease in dairy animals. It incurs huge economic losses due to reduced milk production, poor milk quality, and increased veterinary costs. Its subclinical form reduces milk production by about 20 percent. Subclinical mastitis is difficult to detect due to lack of observable signs.

The project of CLSU concluded with a laboratory protocol to detect and characterize TLR4 and MHC II DRB3, which are potential markers to identify resistance to the subclinical forms of mastitis in dairy water buffaloes and goats. These markers will aid the selection of animals with the resistance trait for breeding.

Micropropagation and artificial seed production Papaya Inbreds and Hybrids

Papaya Ringspot Virus (PRSV) is one of the major obstacles for both small- and large-scale producers. It is the most serious disease in papaya which can reduce yield as much as 80 to 100 percent depending on the state of infection.

The promising papaya hybrids and inbreds identified to be moderately tolerant to PRSV with good horticultural traits were successfully mass produced through the UPLB-IPB project using the somatic embryogenesis and micropropagation protocols developed by the project team. Based on the results of field trial, the improved papaya hybrid varieties (i.e., *Hirang*, *Liyag*, and *Timyas*) can produce 43.5 to 46 tons per hectare per year with fruit weight ranging from 1.5 to 3 kilograms.

Human Resource Development

DA-BAR, through its Human Resource Development program, continually offers grants to various NaRDSAF members who want to pursue degrees under the Degree Scholarship Program.

Scholarship Programs

The bureau reviewed and evaluated various documents for the release of entitlements (e.g. stipend and school fees, among others) for the 12 ongoing degree scholars, of which four are taking up an MS degree while eight are taking up a PhD degree.

Scientific Career System

For the Scientific Career System, DA-BAR facilitated the evaluation and endorsement of nine applicants for scientist rank admission and upgrading.

RA 8439

The bureau did the necessary requirement evaluation and submissions, and coordination with DOST with regard to the certification of eligibility under the “Magna Carta for Scientists, Engineers, Researchers and Other S&T Personnel

in the Government.” Nineteen staff members of the bureau were for renewal for one-year effectivity; while four were newly approved effective 18 May 2020.

DA-BAR also participated in the Public Consultation on the draft implementing guidelines and provisions of RA 11312, which refers to the Act of Strengthening the Magna Carta for Scientists, Engineers, Researchers and Other S&T Personnel in the Government, amending for the purpose of RA 8439.

Events amid the pandemic

With the turn of events concerning the COVID-19 pandemic, the 32nd National Research Symposium and 2020 Gawad Saka were both cancelled after a massive deliberation and consideration of the current situation.

Research Facility Development

Research Facility Development program continually provides assistance on the establishment or upgrading of modern and functional agri-fishery R4D infrastructures and facilities, as well as acquisition of up-to-date equipment.

This enabled our Filipino researchers and scientists to generate, upscale, and commercialize technologies that could help address the department’s goal of attaining food security while ensuring productivity and competitiveness of the agriculture sector.

In its continuous effort of strengthening institutional capacities, the program has funded 10 R4D facilities from various SUCs and DA-RFOs.

Inauguration of R4D Facilities

In line with the celebration of PSAU’s 5th anniversary, the Animal Disease Diagnostic Research Facility was inaugurated in Magalang, Pampanga. The facility houses new laboratory equipment intended for pathogenic diseases diagnosis, with priority given on the African swine fever.

DA-Davao Region’s DARRDEN Center was also blessed and inaugurated in Manambulan, Davao City. The center aims to serve as a venue for the exchange of information, technology, and expertise among research institutions—leading to a more unified RD&E approach. This would also serve as a databank of RD&E information and technology in agri-fisheries.

Last on the list would be the three established and inaugurated R4D facilities of DA-Central Visayas in Mandaue City, Cebu:

The Plant Genetic Resources Center, which addresses the need to diversify agricultural crops for conservation and utilization; the Cebu Experiment Station Multipurpose Research Development Center, which enhances its capability in delivering R4D functions; and the Regional R4D Organic Agriculture Center, which helps in the promotion of related technologies in the region.

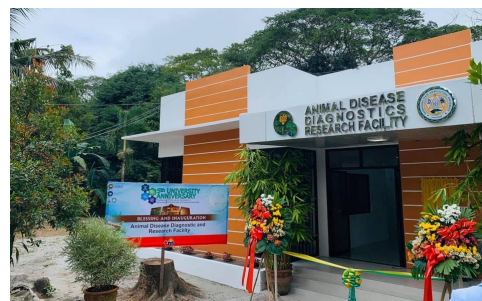


PHOTO COURTESY OF PSAU



PHOTO COURTESY OF DA-DAVAO REGION



PHOTOS COURTESY OF DA-CENTRAL VISAYAS



Intellectual Property Rights

Since 2004, DA-BAR has been assisting scientists and researchers in protecting their intellectual properties generated through agriculture and fishery research for development projects.

The bureau has facilitated three new and one follow-through trademark applications in 2020.



GRO stands for GO, RESCUE, ORGANIZE

All organic and natural products, services, and systems that Dr. Estela B. Taño of DA-QARES developed for use of assisted associations and groups will carry this mark.



Umis means delicious in Region 10

Products developed by DA-RFO 10 will carry this mark.



Products developed by SLSU-JGE will carry this mark.



Soybean-based products developed by CLSU will carry this mark.

KNOWLEDGE MANAGEMENT

Generated from supported R4D researches and projects in the agri-fishery sector— various publications and IEC materials were packaged by DA-BAR. To ensure technology and information dissemination, the bureau's KM program focused on packaging and distribution of knowledge products to its stakeholders through utilization of various media forms and platforms, even during the global pandemic.

KNOWLEDGE PRODUCTS



10 regular publications packaged



9,202 publications mailed and 33,200 emailed



79 articles published



5 speeches written

28 Online and 2 In-House Seminars

Seminar Attendance



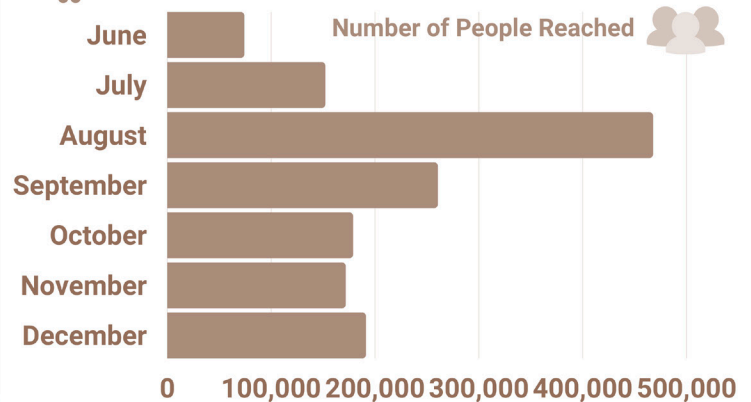
53%

1,494,506



47%

Total Number of Engagements



Top 5 Seminars Attended:

- Soil Preparation and Basic Design on Urban Gardening
- Cacao Production
- Organic Soybean Production and Processing
- Organic Strawberry and Citrus Production
- Organic Seed Production Systems for Legumes and Lowland Vegetables

SOCIAL MEDIA QUICK FACTS



48 technologies featured

107 photoreleases published



522 articles shared or reposted

1,108 photos and 52 videos posted



60 announcements posted

2,568 queries answered



PAGE INSIGHTS

57,198 likes and 61,905 followers



912 followers and avg. of 13 likes per post



25,325 subscribers and 970,508 total views



96,936 page views, 57,202 new visitors, and 8,541 returning visitors



Regional Research Development and Extension Network

RRDEN serves as a mechanism for a network of agencies to collaboratively manage and implement their regional RD&E agenda and program for agriculture and fisheries.

The Regional Research Divisions, under the guidance of DA-BAR and in close coordination with SUCs, are mandated³ to develop and maintain a network of regional and provincial collaborators in their RD&E programs.

In 2020, DA-BAR continually supported RRDEN by providing technical and financial assistance to the network.

To ensure complementation of RD&E programs and activities among RD&E institutions as determined by the national priorities set by DA-BAR and the regional priorities, planning workshops and proposal reviews were conducted and attended by RRDEN members (e.g. DA-RFO, DA-BFAR, DOST, SUCs, and private sector partners in the regions).

The activity aimed to further establish definitive roles and expanded linkages among members, and identify prioritized researchable areas of the region.

Other activities were aligned to strengthening, sustaining, and enhancing complementation, linkages, and partnerships among research agencies and institutions within the region; developing and promotion transfer of information and technologies to end users; and enhancing management capability, among others.

In particular, DA-Davao Region held the blessing and inauguration of the DARRDEN R4D facility. The facility serves as operation and coordinating office of regional network members towards advancement of RD&E partnership, as well as collaboration between the government and the private sector.



PHOTO COURTESY OF DA-SOCCSKSARGEN

³ As stipulated in the Implementing Rules and Regulations of Agriculture and Fisheries Modernization Act

International Partnerships

DA, BAR, AFACI on strengthening agricultural cooperation and promoting sustainable agriculture and food technology



Adaptability trial of tomato breeding lines

DA, through BAR as the national coordinating agency in the Philippines, has been committed to the goal of the Asian Food and Agricultural Cooperation Initiative (AFACI) of the Rural Development Administration (RDA) to promote sustainable agriculture and food technology through the development and dissemination of agricultural technologies.

The Philippines, as one of AFACI's 14 member countries, has implemented 14 completed and five ongoing AFACI-funded projects conducted by DA's staff bureaus and attached agencies and selected SUCs.



PHOTOS COURTESY OF DA-BPI

The ongoing projects include the development of technologies on agricultural products processing, selection and dissemination of elite salt-tolerant rice varieties, development of vegetable varieties, development of the Soil Atlas of Asia and National Information System, and establishment of Prevention Network for Migratory Pests in Asia Region.

Further, DA-BAR is also facilitating and coordinating the AFACI Communication Fellowship Program (CFP) since 2013. The program aims to promote and strengthen cooperation, information sharing and knowledge exchange, and public relations among AFACI member countries.



Moringa nursery

PHOTO COURTESY OF DA-PHILMECH

Seven communication specialists from DA-RFOs and DA-BAR were sent to the AFACI office in RDA, Jeonju, South Korea. CFP is tasked to produce and disseminate communication and knowledge products on AFACI project outcomes through various multimedia platforms. CFP also assists in the coordination of AFACI projects and RDA activities.

DA, BAR, FAO on conservation and sustainable use of agrobiodiversity

As the lead coordinating agency of the ongoing project “Dynamic Conservation and Sustainable Use of Agrobiodiversity in Traditional Agroecosystems of the Philippines,” DA-BAR worked closely with FAO, provincial governments of Ifugao and South Cotabato, LGUs, and other pertinent government agencies in providing interventions and further capacitating farmers and indigenous people in maintaining agro-ecosystems.

Also known as the ABD project, this is funded by Global Environment Facility (GEF) through FAO. It aims to enhance, expand, and sustain the dynamic conservation practices that sustain globally significant agro-biodiversity.

Among the priority crops of the project are traditional rice varieties (TRVs), tomato, ginger, taro, yam, banana, eggplant, mung bean, and abaca. The Project Management and Coordination Unit of FAO-GEF provides support in the implementation of the project.

Seventeen community seedbanks were provided to 17 pilot barangays. Sixteen demo farms planted with 10-23 TRVs have engaged 16 farmer cooperators.

The Lake Sebu Indigenous Women and Farmers Association (LASIWFA) and Hingyon Highland ABD Producers and Processors Association

are organized producer groups established through the project while further strengthening the capacity of the Hungduan Heirloom Rice Producers’ Organization towards the value addition of the said agrobiodiversity crops and enterprise development. Further to these are the conduct of enterprise development activities, particularly on the development and processing of ABD products for community-based enterprises; hence, establishing market linkages.

Activities to facilitate the establishment of mechanisms on the recognition of the Locally Important Agricultural Heritage Systems (LIAHS) were conducted, as well as the National Agrobiodiversity Stakeholders’ Forum, provincial-level orientation on LIAHS, and capability mentoring to local government staff on institutionalizing LIAHS, and mainstreaming agrobiodiversity in the various programs of the municipalities.

As part of continuous capacity building, indigenous peoples, farmer producers, and associations were introduced to enhance programs of the Farmer Field School Sessions aligned with the cropping season of the TRVs and its corresponding indigenous knowledge systems and practices.

Through the project, various IEC materials were also packaged and disseminated.



LASIWFA

PHOTO COURTESY OF FAO

ISO 9001:2015 QMS certification

Certificate

Standard **ISO 9001:2015**

Certificate Registr. No. **01 100 1934762**

Certificate Holder:  **Bureau of Agricultural Research**
RDMIC Building, Elliptical Road cor.
Visayas Avenue, Diliman, Quezon City,
1104 Philippines

Scope: **Coordination and provision of grants to agriculture and fisheries researches**

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: **The certificate is valid from 2019-08-13 until 2022-08-12. First certification 2019**

2019-08-13


TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

www.tuv.com



DA-BAR maintained its International Organization for Standardization (ISO) 9001:2015 Quality Management System (QMS) certification, as recommended by TÜV Rheinland, after successfully passing the second stage of the surveillance audit on 30 October 2020.

In August 2019, the bureau received its certification in line with the instructions of Agriculture Secretary William Dar for all DA agencies and units to be ISO 9001:2015 certified.

From the audit areas, no non-conformity was raised by TÜV Rheinland Auditor thereby confirming the bureau’s QMS, with the scope “Coordination and provision of grants to agriculture and fisheries researches.”

The bureau’s certification is valid until 12 August 2022.

Key Officials

Effective 4 January 2021, DA-BAR will be working under three divisions: Research Program Development, Research Coordination, and Knowledge Management and Information Systems.

The bureau will be led by Dr. Mamaril and Lales as DA-BAR's new director and OIC-assistant director, respectively, following the early retirement of Dr. Eleazar and Sandoval.

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AFMA

Agriculture and Fisheries Modernization Act

BCR

Benefit-cost ratio

BFAR-NFFTDC

Bureau of Fisheries and Aquatic Resources-
National Freshwater Fisheries Technology Center

CPAR

Community-based Participatory Action Research

CELPA, Inc.

Center for Environmental Law
and Policy Advocacy, Incorporated

CLSU

Central Luzon State University

DA

Department of Agriculture

DA SCEC

Department of Agriculture Scientific
Career Evaluation Committee

DA-BAR

Department of Agriculture-
Bureau of Agricultural Research

DA-BFAR

Department of Agriculture-
Bureau of Fisheries and Aquatic Resources

DA-BPI

Department of Agriculture-
Bureau of Plant Industry

DA-CALABARZON

Department of Agriculture-Cavite, Laguna,
Batangas, Rizal, Quezon

DA-NFRDI

Department of Agriculture-National Fisheries
Research and Development Institute

DA-PCC

Department of Agriculture-
Philippine Carabao Center

DA-PhilMech

Department of Agriculture-Philippine Center
for Postharvest and Mechanization

DA-PhilRice

Department of Agriculture-
Philippine Rice Research Institute

DA-QARES

Department of Agriculture-
Quezon Agricultural Research
and Experiment Station

DA-RFOs

Department of Agriculture-Regional Field Offices

DARRDEN

Davao Region Research, Development
and Extension Network

DOST

Department of Science and Technology

GAP

Good Agricultural Practices

FAO

Food and Agriculture Organization
of the United Nations

FDA

Food and Drug Administration

IRR

Internal Rate of Return

IRRI

International Rice Research Institute

ISU

Isabela State University

ISU-CVDC
Isabela State University-
Cagayan Valley Cacao Development Center

LGU
Local Government Unit

MIMAROPA
Occidental Mindoro, Oriental Mindoro,
Marinduque, Romblon, and Palawan

MHC
Major Histocompatibility

MS
Master of Science

NaRDSAF
National Research and Development System
in Agriculture and Fisheries

NCPC
National Crop Protection Center

NPK
Nitrogen, phosphorus, and potassium

NPV
Net Present Value

NSIC
National Seed Industry Council

NSIC CV
National Seed Industry Council Cassava Variety

NTCP
National Technology Commercialization Program

PhD
Doctor of Philosophy

POT
Package of Technology

PSAU
Pampanga State Agricultural University

SEAFDEC
Southeast Asian Fisheries and Development
Center

R4D
Research for Development

RD&E
Research, Development, and Extension

RFDG
Research Facility Development Grant

ROI
Return on Investment

S&T
Science and Technology

SLSU-JGE
Southern Luzon State University-
Judge Guillermo Eleazar

SUCs
State universities and colleges

TLR4
Toll-like receptor 4

UPLB
University of the Philippines Los Baños

UPLB-IPB
University of the Philippines Los Baños-
Institute of Plant Breeding

VSU
Visayas State University

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ABOUT THE COVER

The COVID-19 pandemic put a stopper to the flow of omnipresent activities around the globe. The world as know it was put on hold. The agriculture and fishery industries were the only ones left continuously moving to feed the people.

Rooted in its vision and mission, the bureau adapted and shifted its strategies to respond to the challenges brought by the pandemic and to continuously serve its most important stakeholders, farmers and fisherfolk, through various research for development programs, projects, and activities.

PHOTOS ON THE COVER ARE COURTESY OF DA-SOUTHERN TAGALOG INTEGRATED AGRICULTURAL RESEARCH CENTER, DA-BFAR ILOCOS REGION, AND DA-EASTERN VISAYAS

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