

# RESEARCH FOR DEVELOPMENT BARDIGEST

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## Accelerating sustainable food systems in Cagayan Valley through rice-duck farming system



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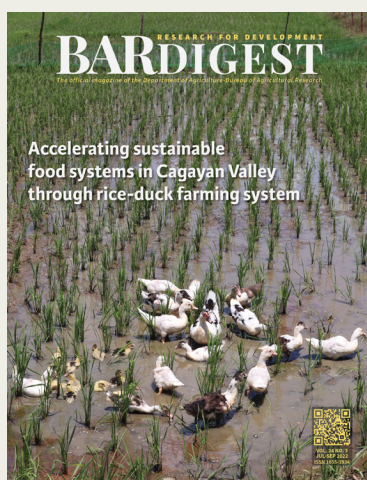
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## ABOUT THE COVER



COVER PHOTO: DA-CVRC

Farmers in Cagayan Valley used to either solely raising ducks or managing their rice field with some finding it a challenge to sustain a productive rice field at the same time raise ducks in a healthy manner.

This prompted DA-Cagayan Valley to introduce a farming system that integrates duck into the rice field. To contribute in ensuring a sustainable production and availability of food in the region, a range of good technologies and practices for rice farmers and duck raisers at a specific rice production stage were developed.

We welcome and appreciate your comments and suggestions. Reach us via email [ikm@bar.gov.ph](mailto:ikm@bar.gov.ph).

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**Agricultural Magazine of the Year**  
2007 Binhi Awards

**Best News Magazine**  
2003 Gawad Oscar Florendo

# Enhancing science communication for a more effective agri-fisheries R4D knowledge exchange

SAILILA E. ABDULA, PhD

Anchored on its vision of a technology-empowered sector and driven to ensure optimum utility of research for development (R4D) to the agriculture and fisheries sector, the Department of Agriculture-Bureau of Agricultural Research (DA-BAR) recognizes the important role that communication plays in carrying out its R4D services. Banking on the knowledge and skills of its human resource to effectively and successfully deliver this commitment to the stakeholders, the bureau provides capacity building opportunities that further strengthens their respective areas of specialization.

Recognizing the importance of science communication in realizing these goals and disseminating R4D knowledge and information to the general public, a short course on Communicating Agriculture and Fisheries for Inclusive and Sustainable Development was offered to the bureau's technical staff, particularly to its information officers. This training-course is part of the Information and Knowledge Management Mentorship Program developed and mentored by technical experts from the College of Development Communication and was facilitated by the Office of the Vice-Chancellor for Research and Extension University of the Philippines Los Baños.

The course, comprising three modules with seven lessons, intends to present science communication as a vital tool in advancing inclusive growth and sustainable development through agriculture and fisheries R4D.

More so, it teaches the application of principles and techniques on science communication, popularization, and storytelling, encouraging the learner-participants to squeeze out their creative juices in photography, and in online and social

media writing when delivering knowledge-exchange materials to the greater public.

Practical application of learnings were evaluated through sharing of outputs such as photo stories, feature articles, and infographics, where both mentors and participants exchanged important notes and insights. Relative to this, the course's final output challenged the participants' understanding of the modules through the production of a special issue of the bureau's R4D Digest, showcasing various forms of knowledge communication materials.

For this issue, the content circled on the outscaling and mass production of various R4D technologies that the bureau has supported. It highlights the bureau's initiatives on Expanded Rural-based Integrated Farming Systems, a sub-program under intensified farming systems under an Inclusive Market-Oriented Agri-Business Orientation. The programs, activities, and projects collated in this issue feature various crops and the mass production and propagation of its planting materials, as well as outscaling of farming systems and grow-out, hatchery, and nursery protocols.

Every page of this digest is a testament to the deep understanding and invaluable knowledge that our learner-participants gained from the short-course they underwent. Equally, we recognize the efforts of our experts and mentors who have well delivered the modules and catered to our learner-participants' queries, concerns, and other endeavors to the best of their abilities. Ultimately, the collaborative efforts of the UPLB and DA-BAR have and will continue to contribute to the information and knowledge exchange, extending as far as their words can reach—for and in pursuit of an empowered agriculture and fisheries sector. 📌

# Utilizing and value-adding underutilized plants in Mindanao

SALVACION M. RITUAL



Have you imagined rice cake made from cocoyam and fern? Or a flatbread and *pandesal* utilizing cocoyam and fern flour? How about a milk tea from fern and ice cream from wild *pechay*? These processed foods are just some of the products with potential for commercialization from the indigenous vascular plants found in Mindanao.

In the Philippines, there are many neglected and underutilized plants that are considered beneficial due to their contribution to sustainable

and healthy food systems. Among them, as known in local or English names are the *lutya* or *yautia* (cocoyam), *pako* (edible fern), *kolo* (breadfruit), *apat-apat* (water clover), *niyog-niyogan* (palm-like fig), *biga-ok* (wild pechay), *pakong tubig* (watersprite) and *hagnaya* (climbing fern).

This diversity is at risk of disappearing if not properly conserved and utilized. While these plants have been historically part of indigenous cultures and traditional diets, most people

The research project benchmarked the potential of the indigenous vascular plants for the production of alternative food source.

nowadays are simply not aware of their value.

### Exploring the underutilized

Funded by DA-BAR, the Central Mindanao University (CMU) implemented the project “Morphology, Ex-situ Conservation, and Physicochemical Evaluation of Mindanao Indigenous Vascular plants as Alternative Food Source” in 2019. This initiative was led by CMU researchers, Dr. Gina Barbosa, Dr. Victor Amoroso, Dr. Annabelle Villalobos, Domingo Lodevico, and Mr. Rainear Mendez.

With the overall goal of determining the effectiveness of utilizing indigenous vascular plants as alternative food source – the project aimed to propagate and conserve selected indigenous plants, generate a database of morphological description and physicochemical characterization as well as to develop nutritious food products.

Under the project, a series of activities were conducted to further promote the utilization of this nature’s bounty and enhance their conservation. This also trained farmers and community members on the propagation and preparation or processing of food products.

Determining the morphological and physicochemical properties of indigenous species is critical in ensuring continuous appreciation, conservation, and sustainable use of this natural resource. From propagation to processing into food products, the lack of pre-existing knowledge and food content analysis could effectively be addressed if benchmark information is available. Hence, prior to product development these indigenous plants underwent characterization and content analysis.

According to Dr. Gina Barbosa, project leader, “the research project benchmarked the potential of the indigenous vascular plants for the production of alternative food source. This may be approached as whole food and for lengthening availability for consumption as noodles, flour, and tea. Our preliminary studies and development of products from selected ferns and flowering plants showed potential for product commercialization”.

“These plants play a vital role in the diet and everyday sustenance of local communities. However, these have not been studied for their physicochemical properties, nutritional value, or varied bioactivity and cytotoxic properties. With the destruction of our natural habitats, it is important that the propagation and conservation of these food plants are highlighted in this study”, Dr. Barbosa added.

### Project milestones and moving forward

Eight main indigenous vascular plants, namely: *Xanthosoma sagittifolium* (Lutya, Bisol var), *Xanthosoma sagittifolium* (Lutya, Dumpol var), *Marsilea crenata* (Apat-apat), *Ceratopceris thalictroides* (Watersprite), *Stenochlaena palustris* (Hagnaya), *Ficus pseudopalma* (Niyog-niyogan), *Pentaphragma grandiflorum* (Wild pechay) and *Diplazium esculentum* (Pako) were planted and processed into food products.

Nine food products were developed including *lutya-pako* rice cake, *ferndesal*, *lutya-fern* flat bread, noodles, *lutya-fern* tart, fern chips, ready-to-drink *niyog-niyogan*, fern milk tea, and wild *pechay* ice cream. Notably, some of the studied species revealed promising nutritional value and antioxidant property that can be used to fortify food products.

Initial assessments on the potential benefits to the local community revealed that local farmers gained more interest in propagating indigenous plants particularly *lutya* or *cocoyam*. The demo-farm established by some farmer-beneficiaries encouraged other farmers to plant *lutya* and other indigenous plants. To which, propagation and conservation of these commodities could lead to sustainability in the long run.

As shared by Jake Cornito, a farmer-beneficiary, “the project opened up opportunities to learn and discover new sources of income. We got planting materials and technology from CMU, especially on food product development.”

“Currently, I maintain a demo-farm where I grow fern, and am able to share the new knowledge and teach the value of farming to my neighbors,” he added.

Indeed, maximizing the potential of neglected and underutilized plants through utilizing and value adding will contribute in ensuring food security and environmental resiliency. This is also an effective means to enhance the nutrition and health status of the community as well as provide additional income for farmers.

Finally, the project team recommends further investigation on the nutritional value and antioxidant property of these plants. More importantly, further optimization of the developed food products and their potential commercialization could be included in the sustainability plan. 🌱

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# Tissue-cultured planting materials to promote MIMAROPA's Lakatan industry

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A popular dessert in the Philippines is the Lakatan banana. In most Filipino households, it is served during meals anytime of the day and is eaten fresh. Cafeterias and *turo-turo* restaurants, offer it along with other fruits or dessert choices.

Lakatan banana is produced due to its sweet fragrance and good eating quality. The pulp which is orange-yellow when ripe is associated with high Vitamin A content. It is a favorite among many people and is considered as the best tasting variety among bananas that are available in the market.

The Philippine Banana Industry Roadmap 2021-2025, showed that

the total volume of production of Lakatan banana from MIMAROPA for 2020 was 8,915 metric tons. Data provided by the DA-Bureau of Plant Industry-National Plant Quarantine Services Division, Oriental Mindoro revealed that the total volume of production from the province from 2012-2022 was 137.87 mt only, a very small contribution to the total annual production of the region.

In order to increase the contribution of the province and respond to the demand for Lakatan banana in the local market, the DA-MIMAROPA proposed for the mass propagation of quality planting materials through tissue culture.

Aside from producing quality planting materials for Lakatan that are available and accessible to banana farmers, the project funded by DA-Bureau of Agricultural Research also aims to expand the market for planting materials and bananas not only in MIMAROPA but also to other nearby provinces. Through the technology, it aims to make Oriental Mindoro known as a source of quality planting materials. Lastly, to promote protocols on production and management of tissue-cultured and existing banana plantations through good agricultural practices to increase yield.

An on-site training was conducted with funding from the DA-BAR

to improve capacities and awareness of plant propagation, nursery establishment, and crop production practices. The training participants are banana farmers, agriculture technicians, and barangay officials. The package of technology taught to the banana farmers opened their eyes to the importance of farm management practices to increase the yield of Lakatan banana plants.

Eight banana cooperators with two hectares each committed and pledged their area for demonstration. Five of them have received tissue-cultured clean planting materials. Three out of the five banana cooperators are now harvesting Lakatan banana bunches with a farm gate price of PhP 25 per kilo. A total of 7,920 planting materials were produced and distributed in coordination with the Municipal Agricultural Officers of Bansud, Bongabong, and Roxas in Oriental Mindoro.

A farmer from Romblon, who saw the market opportunity

for Lakatan banana, expressed interest on the tissue-cultured planting materials and has planted his one-hectare farm on 13 June 2022.

Demand for quality planting materials is expected to increase and expand as farmers and budding agri-entrepreneurs take an interest in Lakatan banana production. The banana industry roadmap (short-term target 2022-2025) likewise recommends the production of tissue cultured planting materials for lakatan which will be needed in the rehabilitation and expansion of plantations. To ensure the source of quality planting materials of Lakatan banana, NSIC approved variety MAPILAK (mother plant) was purchased from the National Plant Genetic Resources Laboratory, University of the Philippines, Los Banos (NPGRL, UPLB) and planted at the DA station. Nurseries were established in Brgy. Kaligtasan, Bongabong, owned and operated by Arturo M. Trinidad and in DA-Regional

Integrated Agricultural Research Center (RIARC) in Brgy. Alcate, Victoria.

The project cooperators are currently receiving free planting materials, fertilizers, and other tools. Quality planting materials will be produced in 40,000 pieces over the course of the project and distributed to members of organized farmer associations, cooperatives, and indigenous peoples' communities. Each planting material will cost PhP 35 once the target number of planting materials has been distributed.

The DA-RIARC received its Certificate of Accreditation for plant tissue culture facility issued by the DA-BPI National Seed Quality Control Services on 17 August 2022. 📄

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# CALABARZON toward more PhilGAP farms

RENA S. HERMOSO



*“Ang pagkakaroon ng [Philippine Good Agricultural Practices (PhilGAP)]-certified farm ay isang malaking tulong hindi lang sa farmers kundi sa mga consumers na tumatangkilik ng produkto. Kapag sinabi kasi na PhilGAP-certified ay may kasiguraduhan ang bawat kakainin mga gulay na ito ay may magandang kalidad, ligtas sa mapaminsalang kemikal, at walang kontaminasyon na makakasama sa kalusugan,”* shared Bernadeth H. Carandang, secretary of the farmer group Magallanes-Samahang Magsasaka ng Kay- Apas at Medina in Magallanes, Cavite.

PHOTOS COURTESY OF DA-CALABARZON



Carandang added that PhilGAP promotes the good quality of the products, therefore, opens up more opportunities for them in the market. In this way, farmers’ profits will increase, hence further improve their lives.

## What is PhilGAP?

PhilGAP is a set of food safety standards that farmers must conform to through certification. The DA-Bureau of Plant Industry (BPI) issues PhilGAP certificates for free and valid for two years to applicants who passed the assessment. The applicants, however, are expected to shoulder costs for farm improvements such



as provision for storage area of fertilizers, farm implements, and pesticides, as well as makeshift toilets on farm.

PhilGAP uses recommended packages of technologies (POTs) coupled with rigorous recordkeeping. Individual or group applicants must undergo various training and pre-inspection leading to the final assessment and certification by DA-BPI.

By adopting PhilGAP, farmers and fishers can leverage market access since crops produced from PhilGAP-certified farms command better prices and are preferred by institutional buyers; hence, securing a stable market for their produce and eliminating the need for wholesalers.

Through PhilGAP, we are not only providing people with food that is safe to eat and of good quality, but we are also reducing the risks of farmers in the field while providing them with better options to market their produce.

### **PhilGAP-certified farms in CALABARZON**

As of December 2020, there are 81 PhilGAP-certified farms in CALABARZON. Most of these were initiated by the DA-CALABARZON Research Division, building on the previous projects done by the division. They have established a certification scheme from the municipality to the regional field office and DA-BPI. Technical assistance was given to every prospective farmer.

“The push from the institutional buyers in requiring PhilGAP certificate as one the policies before institutionalizing farmers and farmer groups as suppliers led to the increase of farmers’ awareness on PhilGAP. This demand from the market

helped us to establish strategies in implementing and adopting PhilGAP in the region,” explained research staff and PhilGAP assessor Pearly Mariel U. Valenzuela-Llagas.

“It is also important that implementers understand that just teaching the farmers on PhilGAP will not make them adopt it afterwards. We guided them not just in conforming to the standards, but we also extended help in establishing their farms, putting up records, changing their behaviors, and capacitating them until they are ready for the inspection by DA-BPI. This was instrumental in our implementation,” she added.

The recent related initiative of the region, funded by the DA-Bureau of Agricultural Research, was the outscaling of vegetable-based farming systems toward PhilGAP certification in Magallanes, Cavite. Sixty-five farmer cooperators attended the training in preparation for the PhilGAP assessment and certification.

As of writing, the 45 farmers are preparing their farm themselves for the upcoming PhilGAP inspection with DA-BPI scheduled on 25-29 July 2022. They are finishing the storage rooms and packing facilities, for which they also received assistance from the project.

The push from the institutional buyers in requiring PhilGAP certificate as one the policies before institutionalizing farmers and farmer groups as suppliers led to the increase of farmers’ awareness on PhilGAP. This demand from the market helped us to establish strategies in implementing and adopting PhilGAP in the region.

The research staff are constantly and closely monitoring and coordinating with the local government unit and the farmer groups to ensure that all farms will pass the assessment and eventually be given PhilGAP certification.

They also trained the farmers on the following: 1) community organizing and values formation; 2) POT on vegetable production; 3) codes of GAP for fruits and vegetables 4) market linkage, and business and financial management; 5) organic agriculture and vermicomposting; and 6) agricultural clustering.

“With the PhilGAP protocol that the Research Division of DA-CALABARZON had established, we are humbly offering and encouraging every regional office to adopt the said protocol and push through with PhilGAP certification,” said project leader and PhilGAP inspector Virgilia D. Arellano. 📍

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# Accelerating sustainable food systems in Cagayan Valley through rice-duck farming system

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PHOTO COURTESY OF DA-CVRC

A farmer for 30 years, Arcadio Garcillian of Lapogan, Tumauni, Isabela, used to solely raise ducks before, confined in housing and fed with rice bran. This often leads to undernourished ducks with increasing prevalence of rice pests and diseases. His problem resonates with other farmers in Cagayan Valley which found it problematic to sustain a productive rice field and at the same time raise ducks in a healthy manner.

## The system, practices, and the technology

In 2020, the DA-Cagayan Valley

introduced the rice-duck farming system project, Outscaling of Rice-Based Farming System (Rice + Duck) in Open Source Pump Irrigated Areas in Ilagan and Tumauni, Isabela. The project, according to Gemma G. Bagunu, aimed to introduce an integrated farming system like rice and duck that ensures a sustainable production and availability of food, which is a good development strategy to help alleviate the impending food crisis in the Philippines.

The project promoted integrating duck into the rice field by range of

Nagbago ang aking pananaw sa pagsasaka dahil natutunan ko ang hindi mag-spray ng mga pesticides para sa mga damo at kalabang insekto sa aking palay dahil may mga pato na sa aking palayan na siyang namamahala sa mga ito.

good technologies and practices for rice farmers and duck raisers at a specific rice production stage.

“For example, in a 1,000 square meter area, 20 heads (200 heads per hectare) of 20-45 day old ducklings were released in the field after 200 days from transplanting until the heading stage of the rice. Ducklings were grazed in rice paddies in the morning and evening,” Bagunu explained.

When ducklings are released, they paddle on soil that helps improve aeration and feed on the weeds, insects, and pests like golden apple snail, which is known to be a prevalent pest for rice.

Then, during flowering stage, ducklings were transferred to cages with pond. To supplement their feeding requirements, feeds contained locally fermented feed formulation of azolla, golden apple snail mixed with rice bran and other leguminous crops or forages.

Garcillan signed up to join the project and a year after joining, noticed a significant effect in his field and with more than a year of adopting the technology, he shared that he was able to share how the low-cost technology brought significant changes.

“Nagbago ang aking pananaw sa pagsasaka dahil natutunan ko ang hindi mag-spray ng mga pesticides para sa mga damo at kalabang insekto sa aking palay dahil may mga pato na sa aking palayan na siyang namamahala sa mga ito,” Garcillan said.

“Sa pataas na pataas na presyo ng abono at pestisidyo at iba pang gastusin sa pagsasaka, ang pagtaas ng income dahil sa rice-duck system para sa akin ay isang malaking kaginhawaan bukod sa nakakatulong na sa aming kabuhayan ay masasabi kong sustainable na proyekto dahil ito ay isang sistema,” he added.

As low-cost feed for ducks, farmer-cooperators were trained to produce locally-fermented feed formulation.

“*Napahanga ako ng teknolohiya. Iyong paggawa ng mga supplemental feeds sa pato kapag sila ay inalis na sa palayan ay itinuro sa amin gamit lamang ang mga dahon na nasa palagid lamang at mga kuhol,*” Garcillan shared.

“Farmers net income of PhP 57,572, PhP 93,534, and PhP 75,590 increased per hectare during the 2020-2021 dry season, 2021 wet season and 2021-2022 dry season, respectively using the Rice+Duck farming system compared to rice monocropping,” Bagunu shared.

Further, the approach led to an average of 20.45% increase in yield and up to 95% reduction of golden apple snail.

Garcillan shared that the noted increment in his income paved the way to notable improvements in his farming productivity and activities.

“*Mabibili ko na ang mga pangangailangan sa pagsasaka gaya ng mga farm inputs at maliliit na makinarya nang hindi na kailangang umutang sa mga private traders na mataas ang porsyento [ng interes],*” he said.

Further, the noted significant results led to change in farming practices and improved cropping system and productivity of rice for the farmers of Ilagan and Tumauini, Isabela.

“*Bumababa ang production cost namin sa pagsasaka at ang pinakamasaya ay lumaki ang kita ng mga magsasaka dito sa Barangay Lapogan. Nadagdagan pa ang kita sa mga pato dahil pwede kong ibenta ang karne at mga itlog nito,*” he shared.

**Developing business enterprise**  
Garcillan, who shared that he

started as a duck raiser now and eventually learned to process duck meat into quack-quack ham, *embutiduck*, *siomaitik*, *longanitik*, mallard *sisig*.

“I can now also process duck eggs into *balut* and salted eggs,” he said.

He is one of the members of the farmer cooperatives/associations who adopted the developed ready-to-eat duck viands registered in Intellectual Property Office as, “Cagayan Valley Duck and Chicken Delight.”

With an increase yield of 500 kilogram, Garcillan further hoped that five years from now he will be a duck meat processor and ducklings seller and more communities will adopt.

“*Dahil padami ng padami ang aking mga pato, siguro after five years ay isa na akong duck meat processor, ducklings seller na rin at na-e-enjoy ko na ang pag-aalaga ng pato na ang playing field ay ang aking palayan,*” he shared.

As he appreciates the technology and the rice-duck farming system, he ended by saying, “*Kami at aking pamilya ay nagagalak sa farming system na ito, at nakakawala ng stress ang pagmasdan ang mga dumadaming pato sa aming palayan at siyempre ang profit na rin na naibibigay sa amin.*”

With the commitment of the farmers, together with the strong partnership of DA-Cagayan Valley, DA-BAR, and other relevant actors, the vision of contributing to achieving sustainable food systems for Arcadio Garcillan and the rest of Cagayan Valley farmers are almost within their reach. 🌱

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# Boosting Batanes' garlic through production of quality planting materials

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Batanes almost always comes to mind when one thinks of a dream destination in the Philippines. The smallest province in the Philippines with only 230 kilometers of land area, Batanes is the country's northernmost province that is known for its historic churches, unique architecture, sandy beaches, and countryside panoramic views, among other local attractions. It is greatly sought by both local and international tourists due to its unspoiled beauty and the peaceful lifestyle of its people—something possibly attributable to its geographical isolation.

Aside from its beauty, Batanes' somewhat seclusion from its neighboring provinces also played a huge role in the preservation and conservation of its garlic varieties—Batanes red & Itbayat white.

Garlic is one of the most popular vegetables and spices in the Philippines. Just like how a list of Philippine dream destinations is not complete without the mention of Batanes, most beloved Filipino dishes, like *sinangag* (fried rice) and *adobo*, will not be the same without garlic.

However, despite our love for garlic; hence its continuously increasing demand in the country, the local production of garlic is decreasing.

## Garlic production in Batanes

Batanes is known as the top producing province of garlic in the Cagayan Valley region. With about 98.5 hectares of its agricultural area dedicated to garlic production, Batanes supplies about 2.34% of the country's total garlic production. Nationally, garlic production is estimated at 7,256 metric tons (2019), addressing only 9% of the country's total requirement. Filling the 91% gap—equivalent to 85,116 mt, is imported garlic.

As shared by agricultural researchers of DA-Cagayan Valley, there are several factors that greatly affect garlic yield in the province. Highlighting these are the limited supply or availability of quality planting materials during planting season and the need to optimize the planting distance as well as nutrient management.

## R4D intervention

To address these gaps, the DA regional office, through its Batanes Experiment Station, implemented a research for development project that is primarily aimed at increasing the supply of garlic quality planting materials that are clean and free from any observable disease. Utilizing conventionally propagated Batanes red and Itbayat white garlic varieties, researchers introduced technology interventions such as the optimal planting distance of 15-20 cm x 10-25 cm using the dibble

method; mulching with rice straw, cogon, grasses, hulls with 3-5 cm thickness; and the use of organic-based pesticide.

Asked on farmers' reception of the technologies, researchers shared that, "At first, garlic farmers hesitated to adopt the introduced technology interventions because they still prefer their traditional way of farming. But when they tried it and saw the results that their production increased, they happily embraced to adopt the technology."

To boost the adoption of technologies, the project collaborated with Batanes Provincial Local Government Unit (LGU) and the Municipal LGU of Basco, Mahatao, Ivana, Uyugan, Itbayat, and Sabtang. Aside from the technical assistance through the respective agricultural office, engaging the support of the LGUs enabled the project to pursue its activities despite the strict pandemic protocols.

As an offshoot, the project was able to establish technology demonstration farms in each municipality with a total area of 6,559 square meters. Seeing the results of the technology intervention, the project was able to engage 131 farmer-partners from said municipalities from which a total of 100,612 sqm was devoted to on-farm garlic production. Adding this to the two on-station

demo farms with a combined size of 4,510 sqm, the project accumulated a total of 11.17 ha for garlic technology demonstration and on-farm production.

To transfer technologies effectively, farmer-partners were also capacitated on organic garlic production and organic agriculture, quality planting and seed production, postharvest handling and seed storing technologies, marketing strategies, and record keeping.

The project also conducted a total of five field days and cross-farm visits that were attended by different LGUs and farmers from adjacent and nearby barangays.

### Results and ways forward

Slated to end in the later months of 2022, the project significantly increased the availability and accessibility of quality planting materials in the province—benefiting at least 200 farmer-partners in the province. The

adoption of project technologies resulted in the production of garlic that are of marketable size and an improved yield of 22,027 kilograms of Itbayat white garlic planted to 8.81 ha; and 3,946 kg of Batanes red garlic planted to 2.36 ha; hence increasing the income of garlic farmer-partners.

To sustain its gains, project implementers plan to establish a seed system to ensure the storing of seeds for the next planting season. To outscale the technology, project is coordinating with the regional office's Field Operations Division and boosting its partnership with the LGUs, in view of the Mandanas ruling, with a focus on transferring the

technologies toward reaching the entire province of Batanes.

Researchers hope that as more farmers adopt the garlic production technologies they have introduced through the project, they can increase and ensure the production of quality planting materials towards continually increasing garlic production in the province and in the country. 📌

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At first, garlic farmers hesitated to adopt the introduced technology interventions because they still prefer their traditional way of farming. But when they tried it and saw the results that their production increased, they happily embraced to adopt the technology.



PHOTO COURTESY OF DA-CAGAYAN VALLEY

# A cup of coffee for every Filipino means income to farmers

DIWA J. VELASQUEZ



Every morning, waking up to the smell of coffee just gives us an idea that a new day is starting. We sit at our dining area with our mug of coffee, and munch on our favorite hot *pandesal* or *tapsilog*. With a sip of coffee, we also enjoy

conversations with our family and friends. It is now a trend that coffee is enjoyed when mixed with ice, whipped cream, and sometimes added in pastries for afternoon snacks. What more can coffee do, especially to our farmers?

In the Philippines, the coffee industry continues to blossom as the demand for Arabica beans increases both in the domestic and global market. With Filipino individuals and businesses mixing and matching ingredients onto their coffee, the increase in local and international coffee chains made the Department of Agriculture refocus on coffee in support of the Plant Plant Plant Program.

But as the market appreciates the demand for coffee, the supply for quality green coffee beans is limited. Use of poor coffee planting materials and lack of knowledge of farmers in producing specialty coffee were concerns that need to be addressed. The coffee production requires sustainable farm management practices that will ensure high productivity, climate change mitigation, and environmental protection.

### **Outscaling coffee-based farming system**

Bansalan, Davao del Sur is known to be a major supplier of upland high value vegetables and Arabica coffee in Davao region due to its climate. Report from the DA-Davao Region showed that Davao del Sur have 800 and 500 hectares of coffee farms and high value vegetable farms, respectively. But it was also presented that the yield decreases by 2.53%, while the bearing tree decreases by 2.09% every year.

As the yield decreased, the income of coffee farmers was not enough to sustain the family's basic needs. Some coffee farmers converted lands into a vegetable farm for a more intensive and high return production.

Interventions on maintaining coffee trees while continuing vegetables in a sustainable way requires intercropping highland vegetables and white potatoes in coffee farms must be introduced. The project titled, Outscaling of Arabica-based

Farming System in Brgy. Alegre, Bansalan, Davao del Sur, intends to increase and sustain productivity and profitability of coffee farms through improved farming systems, sustainable farming, and value-adding technologies.

Project leader Melani A. Provido emphasized that the project covers around 109 hectares of coffee plantation integrated with vegetable (potato, cabbage, and onion). Specifically, the Project aimed to increase production by 25% in 50 ha coffee farms, increase gate price of green coffee beans by 20%, strengthen capabilities and capacities of farmers, and develop partnership with markets.

For Arabica coffee, the Catimor variety is the major cultivar being planted in Brgy. Alegre, Bansalan, Davao Del Sur, and coffee trees are already identified at the bearing stage. The appropriate farming practice in planting high value vegetables such as green onions, carrots, and cabbage will serve as an intercrop for coffee.

In between the coffee trees, white potatoes will be intercropped, particularly the healthy granola variety tubers that will be selected for planting as this is the preferred variety in the market. The harvested white potatoes will then be consolidated by the Davao Regional Agricultural Cooperatives, a distributor in Davao region major markets. The seed tubers must be disease-free, well sprouted, about 30 to 40 grams each in weight and at the right physiological age.

For high value upland vegetables, preferred varieties will be distributed under the project that is suitable in the highlands and those that can command high prices in the market.

### **Training and development of farmers**

With the help of DA-Davao Region, through the local government

unit (LGU) of Bansalan, Davao del Sur, ACDI VOCA-Philippine Coffee Advancement and Farm Enterprise (PhilCafe) Project, and funding assistance from DA-BAR, 60 identified farmers attended an orientation to lay down their responsibilities as beneficiaries or cooperators. Through the LGU-assistance, these farmers then formed the Gagpang Alegre Coffee Small Farmers Association, a Department of Labor and Employment-registered association.

Profiling and a series of workshops were done to identify the demographic data of the farm size, number of coffee trees planted, and preferred vegetables to plant. Information and education campaign was also done through a lecture on latest coffee production, postharvest practices, and pests and diseases.

From this technology, farmers sell fresh harvested coffee beans in Balutakay Coffee Farmers' Association (BACOFA) at a price of PHP 34 per kilogram. Fertilizers and vegetable seeds were turned over to coffee farmers, as well as high density pipes for irrigation systems.

"We have adopted a big brother-small brother approach in our strategy in encouraging and inspiring our Alegre farmers to be known as Specialty Arabica Producer," said Provido.

DA-Davao Region is also set to conduct a turnover of coffee huller and pulper to the community, and train housewives and young adults to do the processing. The region has also tapped experts from BACOFA for further trainings in postharvest and processing of specialty Arabica. 🇵🇭

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# Conquering pests and diseases through

PHOTO STORY BY ANGELO N. PADURA



**The plight of *saba* growers.** *Saba* is one of the most important banana varieties in the country. One solution to decrease pest and disease incidence is through tissue culture and macro-propagation. This has been made possible through Dr. Elbert A. Sana and researchers of Nueva Vizcaya State University (NVSU).



# enhanced plantlet production systems



**Tracing the root of low-yielding farms.** Minalito L. Udcosan, NVSU project staff, inspects the magnitude of damage caused by *Cosmopolites sordidus* or banana weevil infestation in a plantation at Villaverde, Nueva Vizcaya. Based on a study, low yield and high incidence of pest and diseases result from continuous use of field grown banana suckers and low level management of farms.



**Benefitting banana growers.** Planting materials produced through macro-propagation and tissue culture methods are ready for distribution to farmer cooperators and local banana growers in Nueva Vizcaya. The DA-BAR-funded project contributed significantly to the needed supply of sufficient disease-free banana planting materials, specifically in Cagayan Valley.



**Capitalizing on tissue culture.** Analiza L. Esguerra, NVSU research specialist, carefully selects mature and healthy plantlets in preparation for the nursery stage. She emphasized the importance of disease indexing, a preliminary procedure in tissue culture, to produce quality planting materials and prevent the spread of diseases caused by banana bunchytop virus and banana bract mosaic virus.



**Fruits of research and labor.** Joel G. Tinapay, one of NVSU's farmer cooperators, prepares the produce of his banana plantation for market distribution. The research-bred technology produced 5,891 tissue cultured and 2,606 macro-propagated plantlets benefiting the local *saba* growers in the region. "*Kapag mas maraming pangtanim, mas maraming kikitain,*" he shared.



**Farmer-friendly tactic.** Udcosan performs whole corm technique inside NVSU's nursery facility to produce 20-30 quality and disease-free seedlings in a period of 3-4 months. Udcosan stated that the said technique is more viable for local banana growers than other methods which require sophisticated facilities and complex procedures.

# Pagsibol ng panibagong pag-asa sa Quirino State University

PHOTO STORY NI RICARDO G. BERNARDO



**Dobleng kita.** Murang binhi ng oyster mushroom mula sa mga kinolektang agricultural waste ang naging bunga ng proyekto ng Quirino State University (QSU) para sa mga magsasaka at mga interesadong indibidwal. Mula sa fruiting bag, hanggang sa pagsibol ng kabute, pati ang pinagtamnan nito ay pwedeng ibenta at kumita ng doble kumpara sa mga tradisyunal na pamamaraan.



**Produksyon at kita.** Inilunsad ng QSU ang bagong production technology sa pamumuno ni Fredisminda Dolojan. Isinusulong ng proyekto sa mga magsasaka at mga negosyante sa tabing kabute para matugunan ang kakulangan ng



**Negosyo sa kabute.** Ibinibida ni David Teved Caranillo, isang agriculture graduate mula sa QSU, ang teknolohiyang kanyang nagawa na pumapatay ng mikrobiyo o dumi sa fruiting bags bago gamitin sa pagpaparami ng kabute. Bilang adaptor ng mushroom technology ng nasabing pamantasan, gumagawa siya ng mga fruiting bags na kanyang naibebenta sa mga nais ding magnegosyo gamit ang fresh oyster mushroom.



**Karagdagang teknolohiya.** Ipinakita ni Caranillo ang teknolohiya para mapabilis ang pagpapatay ng mikrobiyo sa fruiting bags. Sa pamamagitan ng teknolohiyang kanyang isalang sa multiple chambers para

# Caranillo, Isabela



Ang proyekto ukol sa mushroom  
QSU extension director at project leader  
yektto na mabigyan ng kaalaman ang  
amang pag-aalaga at pagpaparami ng  
sa pagkain at bilang karagdagang kita.



**Bagong kagamitan, bagong paraan.** Isinasagawa ng mga project staff ang  
bagong paraan ng pagpoproseso ng spawn bags gamit ang autoclave sa loob  
ng laboratory ng QSU.



Caranillo ang kanyang sariling gawang  
y ng mikrobiyo sa mga mushroom  
ohiya, mas maraming fruiting bags ang  
ara mapuksa ang mga mikrobiyo.



**Kita mula sa basura.** Binisita ng DA-BAR sa pangunguna ni director Junel  
Soriano ang pasilidad ng adaptor na si Caranillo. Sa isang panayam, idinetalye ni  
Caranillo ang komposisyon ng bawat fruiting bag at kung paano ito nakatutulong  
sa kalikasan sa pamamagitan ng paggamit ng mga nabubulok na basura.

# Propagating bananas, improving lives in Central Visayas

KATHLEEN MAE B. BULQUERIN



Micropropagating bananas entails the following steps:

collection of explants; surface sterilization and culture initiation; culture proliferation; culture rooting; acclimatization, hardening, and potting; care and maintenance of newly potted banana plantlets; and virus indexing.

One of the most important fruit crops in the Philippines is banana, which has numerous potential health benefits. Farmers, cooperatives, traders, exporters, and manufacturers make up the Philippine banana industry, which is dominated by large multinational corporations.

Currently, demand for banana planting materials is increasing, and the issue is a lack of reliable and clean planting materials. Sucker-derived planting materials are insufficient to meet the

growing demand. The process is very slow, and the rate of sucker multiplication by conventional means has been found to have several negative consequences, including disease transmission, low production, and poor preservation of original plant genetic material.

This issue can be solved by propagating bananas through use of tissue culture. Tissue culture technology allows for the mass production of accurate and clean planting material. Furthermore,

tissue cultured bananas are more vigorous, yield more, and produce higher quality fruits.

The DA-Central Visayas employs micro propagation technique technology for the efficient production of banana quality planting material in order to increase production of quality banana planting material.

This, in turn, will accelerate plantlet production and ensure the adoption of high quality planting materials, as well as increase capacities and awareness in plant propagation, nursery management, and crop production practices, and develop transitional strategies to ensure a continuous supply of high quality planting materials.

The DA-Central Visayas has three tissue culture laboratories namely: Cebu Experiment Station (CES), Southern Cebu Farming System Research and Development Satellite Station (SCFSRDSS) and Bohol Experiment Station.

Micropropagating bananas entails the following steps: collection of explants; surface sterilization and culture initiation; culture proliferation; culture rooting; acclimatization, hardening, and potting; care and maintenance of newly potted banana plantlets; and virus indexing.

To ensure that the project will be successful, meetings were conducted by the DA-Management Team headed by Atty. Salvador Diputado, regional director of DA Central Visayas, project staff and 13 city and municipal agriculturists from different municipalities of Cebu Province.

The project was able to distribute 30,000 tissue cultured banana plantlets in the selected municipalities: 13 in Cebu, 10 in Bohol, 5 in Negros Oriental and 2 in Siquijor province.

Continuous mass production of tissue-cultured bananas in the three laboratories of DA-Central

Visayas research stations are still ongoing for the other walk-in clientele. To capacitate the farmer-recipients, three batches of training on banana production, postharvest management and market opportunities were conducted.

The project also established a 0.5 hectare banana production technology demonstration farm in partnership with the Local Government Unit (LGU) of Barili, Cebu. The techno-demo was established on 7 June 2021 in Brgy. Gunting. However, Typhoon Odette damaged the whole area, hence the technology demonstration was re-established on January 2022.

Ongoing monitoring activities are being done in coordination with the LGUs to ensure the sustainability of the project. 📍

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# Modified tilapia production to benefit regions in Northern and Central Luzon

MARIA ELENA M. GARCES



The experience with COVID-19 further highlights the importance of the agriculture sector, particularly fisheries, in ensuring food security especially in times of crisis. The wide range of community quarantine restrictions resulting to decreased labor force and access to essential aquaculture farm inputs, caused food fish shortage, disrupted the food supply chain, and increased prices of fish commodities in the market.

The mobility restrictions due to strict community lockdowns resulted in quantity reduction in farm labor that translated to the overall reduction in agricultural output. Reduced agricultural production was also caused by farmers' limited access to farm inputs and access to markets to sell produce that resulted in profit losses and wastage of farm products.

The fast-growing and prolific tilapia is among the most important aquaculture commodities in the world. It grows fast and easily breeds in captivity. Tilapia is tolerant of various environment and culture systems. This fish even requires little inputs and small-scale fish farmers can easily adopt the simple technology. Investors find farming this fish to be profitable because of its low investment cost and good feeding efficiency in lakes and ponds where natural food are available.

“The availability and accessibility of a community-based hatchery and nursery facilities with the capacity of providing sufficient supply of quality fry and fingerlings will therefore improve aquaculture production in the community level and provide additional employment. The

adoption of the improved technology, will be valuable not only on the community level but rather would improve food sufficiency of the country, and empower people and communities to take control of their own food security while augmenting family income,” shared Ma. Jodecel Danting, co-project leader of the tilapia project.

### Problem solved

Addressing the problem of tilapia supply in community markets during the COVID-19 pandemic should start from the source. The project, Adoption of Modified Intensive Fry production and Nursery Rearing of *Oreochromis niloticus* for Village Level Production in the Northern Luzon, implemented by the National Fisheries Research and Development Institute (NFRDI) and the Bureau of Fisheries and Aquatic Resources-National Freshwater Fisheries Technology Center (BFAR-NFFTC), aimed to ensure sustainable quality seed stock of tilapia. The project is also foreseen to contribute in improving site specific protocols on modified intensive fry production and nursery rearing of tilapia for adoption by village level hatchery operators and nursery operators in the Cordillera, Ilocos, Cagayan Valley, and Central Luzon regions.

Two packages of technologies (POTs) were adopted, namely: Modified intensive tilapia hatchery (MITH) and fry rearing of tilapia to advance fingerling stage. Virtual trainings on the POTs were conducted and project beneficiaries were provided with breeders and fry, supplies and materials, and equipment necessary for the implementation of the project.





Nakatulong ang technology sa pag-unlad ng aking farm dahil sa nadagdagan ng bagong kaalaman at karanasan sa pagpapalago ng tilapia.



Two village level beneficiaries for MITH (1 each in CAR & Cagayan Valley) and six village level beneficiaries for nursery technology (1 in CAR, 2 in Ilocos region, 1 in Cagayan Valley and 2 in Central Luzon) were strengthened. Apart from project beneficiaries, a total of eight tilapia farmers (2 for hatchery and 6 for nursery) adopted the POTs.

With regards to quality of fry/fingerlings for dissemination to grow-out operators, 50 production cycles (hatcheries = 14 cycles; nurseries = 36 cycles) out of 36 targeted cycles were accomplished. The increase in production was not compared because the previous technology practiced by the project cooperators was different from the technology adopted, instead net profit per hectare was computed to determine the increase in profit before and with project intervention and adoption of POTs.

Four nursery cooperators achieved the targeted survival rate of 80-90% from fry to fingerlings. High survival rate was achieved in Cagayan Valley and Central Luzon project sites, with intervention during fish transport (water replenishment and re-oxygenation) and near the source of fry (BFAR-NFFTC). While, the two hatchery cooperators also achieved the targeted survival rate of 80% from egg to fry stage.

Meanwhile, La Trinidad Regional Fish Farm (LTRFF) located at Balili, La Trinidad, Benguet, was provided by BFAR-NFFTC with high quality iExCEL\* foundation

stocks. The iExCEL is a genetically improved tilapia strain which is the product of a selective breeding program of the BFAR-NFFTC. The LTRFF will then serve as central hatchery of iExCEL in the region to cater the requirement for broodstock of hatchery operators and to ensure high survival of broodstock and fry.

### Strengthened market linkage

Through strengthened partnerships among village-level hatcheries and nurseries, grow-out farms, and local markets, the project cooperators were able to cater the fingerling demand of 497 grow-out farms and successfully distributed nearly 6.6 million of tilapia fingerlings.

Meanwhile, grow-out farmers who used the advanced-size fingerlings from the project cooperators achieved a yield of 1.2-23.5 mt/ha which exceeded the target yield of 4-5 mt/ha. High yield were recorded in project sites in Cagayan Valley and Central Luzon, which have large grow-out pond compartments.

The targeted reach of harvested fish within the locality was accomplished but extending it to nearby provinces was only partially achieved due to travel restrictions. Moreover, the tilapia produced was sold to LGUs, direct buyers, and in Kadiwa centers.

Village-level hatcheries and nurseries cater to grow-out operators within their locality, thus, addressing the issue on availability of seedstocks in the area during the pandemic.

### The real one

The adoption of MITH and nursery rearing of fry resulted to a real “Masaganang Ani at Mataas na Kita” among the project beneficiaries. This was evident in a validated cost efficiency where cost and returns analysis was done. Results showed that there were significant differences in the increase in profit per hectare of the project cooperator before and after the project interventions.

Such is the case of one project cooperator, Lym G. Pait of Manabo, Abra. With the adoption of the technology, the project targets a 30% increase per cooperator, but in the case of Pait, it was noted that he achieved a 100% increase in profit, with an income of PhP 80,000-90,000 per cycle as compared to the PhP 7,000-8000 per cycle in his grow-out pond before the project intervention.

*“Nakatulong ang technology sa pag-unlad ng aking farm dahil sa nadagdagan ng bagong kaalaman at karanasan sa pagpapalago ng tilapia,”* he said smiling. 🌱

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\*improved Excellent Strain that has Comparable advantage over the tilapia strains for Entrepreneurial Livelihood projects

# KABU EHAN:



**25,245.77**

average monthly net income for every 1,000 mushroom fruiting bags produced

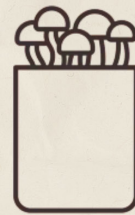
MILESTONES



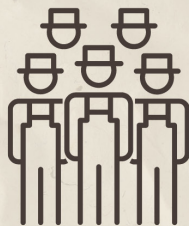
**348** pure culture distributed



**6,960** grain spawn bags distribute



**58,000** fruiting bags distributed



**29** famers and non-farmers associations assisted on production and distribution of quality mushroom inputs



**290** individuals trained on mushroom tissue culture, spawn, and fruiting bag production



**1,450** brochures on mushroom production distributed to the associations

# Expanding livelihood of mushroom farmers in Central Luzon through production enterprises

## SUSTAINABILITY PLAN

for a continuous supply of quality mushroom pure cultures, grain spawn, and fruiting bags



Ensure compliance to the Philippine National Standards for Good Cultivation Practices of Mushroom



Monitor monthly accomplishments to ensure that inputs provided across the value chain are sustained.



Establish strong market linkages/ partnerships between growers, processors, and other stakeholders



Monitor beneficiaries to ensure that the mushroom production enterprise of each association are sustained.

# Improved production of common carp of grow-out protocols in village-

## POND CULTURE

### A Pond Preparation



For existing ponds, catch and collect existing stocks, completely drain the pond, and prepare it thoroughly.

### A.1 Tilling and Pond Leveling



Till the upper 10-20 cm layer of the pond bottom. Level the pond bottom and make a slope toward the gate to ensure complete water drainage.

### A.2 Removal of Unwanted Organisms



Sun-dry the pond bottom and treat pond using chemicals such as the mixture of 21-0-0 and lime at 1:5 ratio at 200 kg/ha or natural toxins such as tea seed at 50 kg/ha. Install gates and screen to avoid intrusion of predators.

### B Stocking Carp Fingerlings



Stock 1-2 cm carp fingerlings (30-60 days old) at 1-2 pieces per square meter. Stocking of fingerlings should be done early in the morning or late in the afternoon (6:00AM to 8:00AM or 5:00PM to 6:00PM).

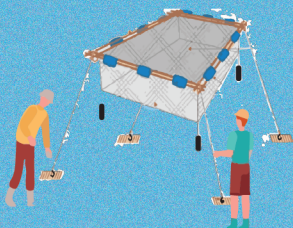
### C Feeding



If pond water becomes clear, this means natural food is limited. Organic fertilizer (chicken, cow or carabao manure) can be applied at one sack of manure for every 500 sqm area of pond to grow natural food. Supplemental feeding of commercial feeds can be done if necessary.

## CAGE CULTURE

### A Installation



Install net cages with a dimension of 10 m by 20-30 m in aquaculture zone in the lake.

### B Stocking



Stock fingerlings early in the morning or late in the afternoon (6:00 AM to 8:00 AM or 5:00 PM to 6:00 PM).

### C Harvest



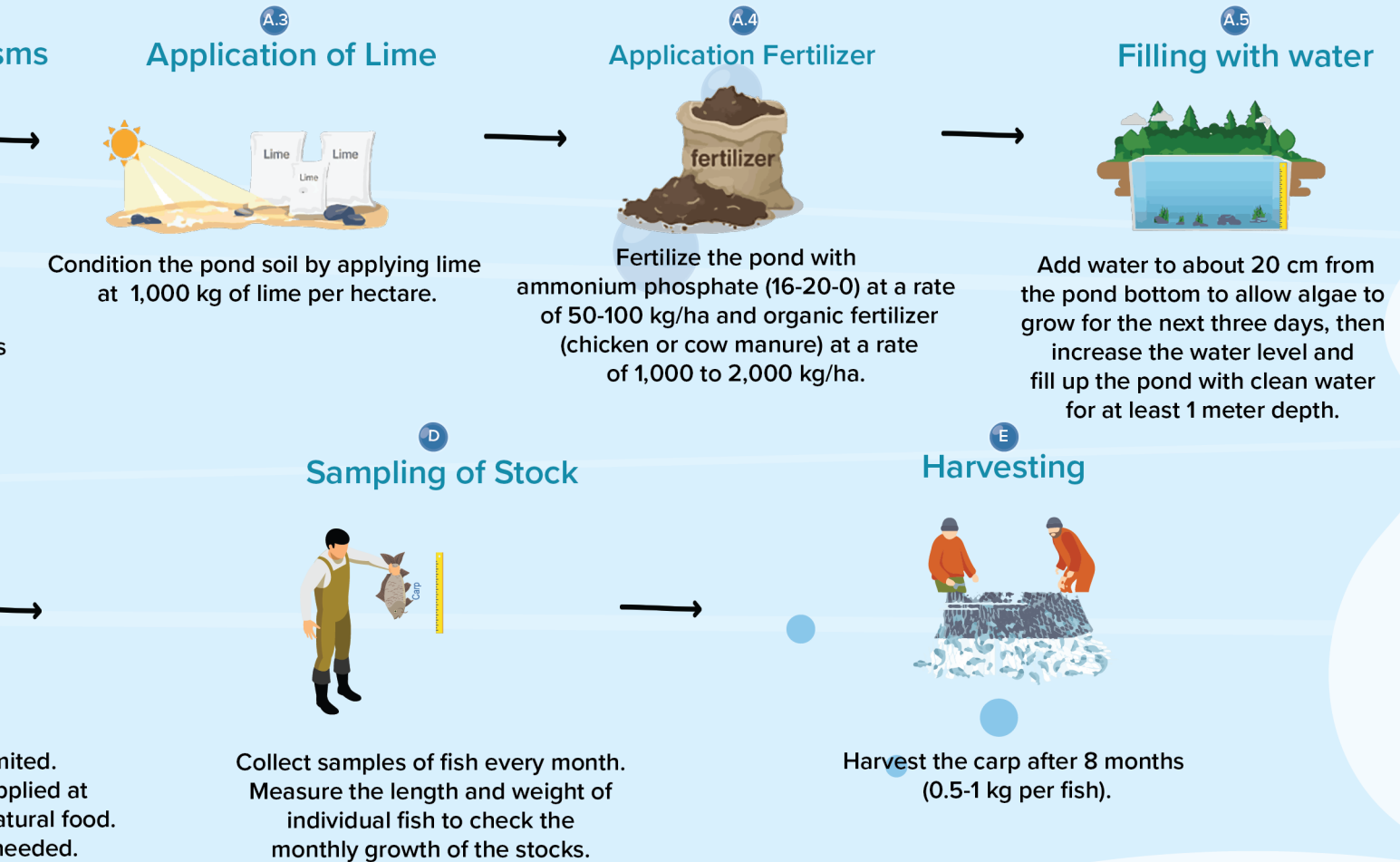
Harvest the fish.

○ POND CULTURE ● CAGE CULTURE

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# Carp (*Cyprinus carpio*) through outscaling level farmers in Laguna and Rizal

## CULTURE



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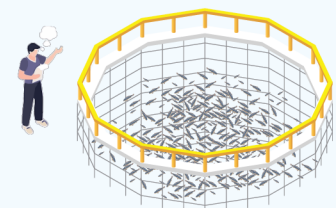


### Monitoring and Recording\*



Maintain logbook and monitoring sheets for proper recording of farm activities.

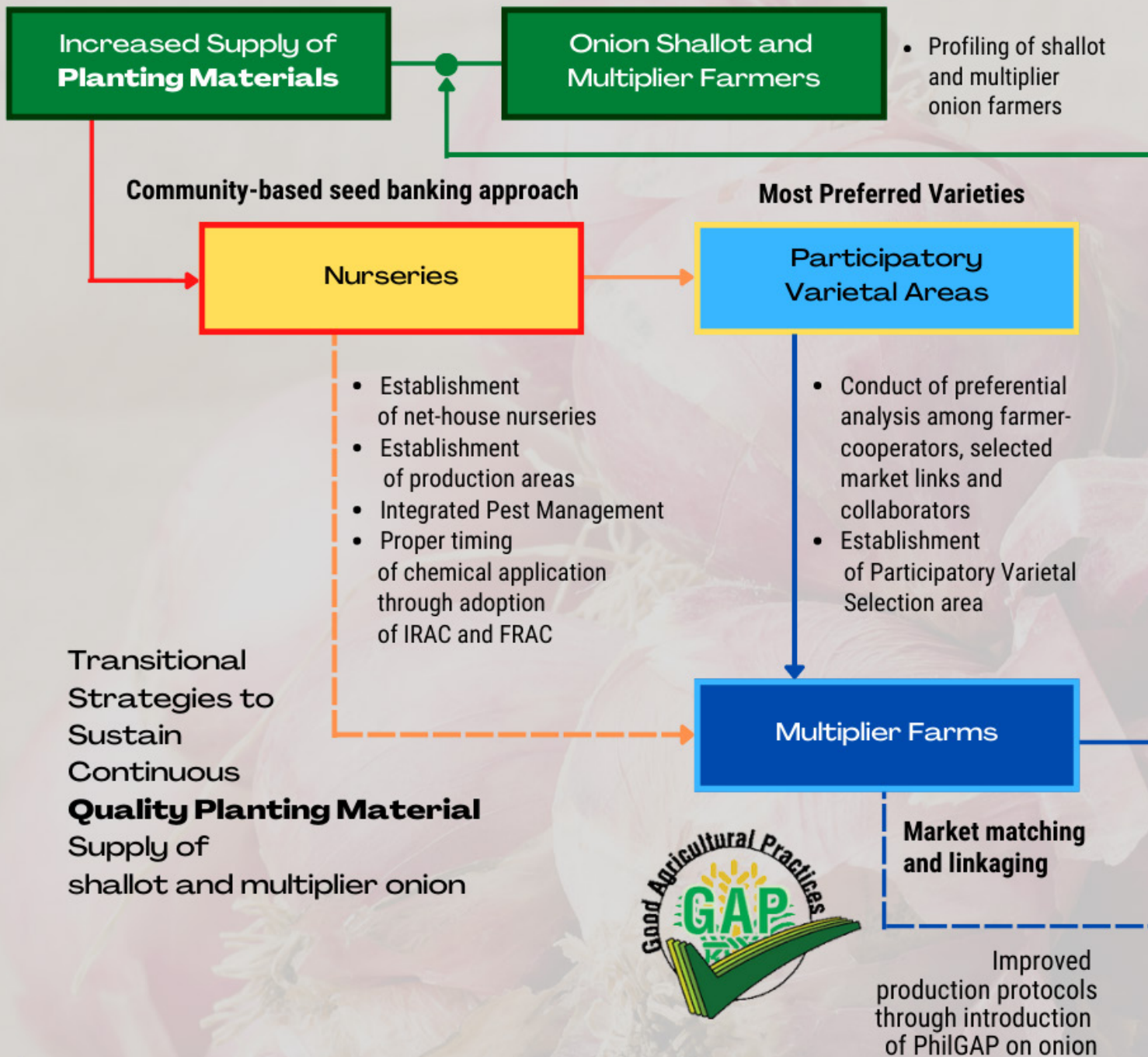
### Documentation\*



Document good aquaculture practices of each cooperators.

\*Done throughout whole process process for both pond and cage cultures

# Production of onion (shallot and multiplier) quality planting material



- 🌱 10 Farmer organizations benefited
- 🌱 8 farmer groups capable as multiplier farm identified and selected
- 🌱 9 farmers associations tied up and linked as planting material farmer-beneficiaries across Central Luzon
- 🌱 50 farmers assisted for PhilGAP Certification
- 🌱 5 nurseries established
- 🌱 8 participatory varietal selection areas established

For more information, please contact **Jerome Gumangan** through email [je.gumangan@gmail.com](mailto:je.gumangan@gmail.com)

# Planting material through mass propagation technique

- Assist onion farmers for GAP certification

## Farmer's most preferred onion shallot variety

Variety	Farmers Preferences	
	Production Aspect	Market Aspect
Maserati F1	<ul style="list-style-type: none"> <li>• Resistant to heavy rain</li> <li>• Good variety</li> <li>• Good leaves</li> <li>• High seed germination</li> <li>• Good height</li> </ul>	<ul style="list-style-type: none"> <li>• Good in color</li> <li>• Big bulb</li> <li>• Can be sold as fresh or dried</li> <li>• Good with skin (balatin) or dry onion</li> </ul>
Batanes Jumbo	<ul style="list-style-type: none"> <li>• Resistant to army worm</li> <li>• High quality seeds</li> </ul>	

## Farmer's most preferred onion multiplier variety

Variety	Farmers Preferences	
	Production Aspect	Market Aspect
Sibuyas Tagalog (Tanduyong)	<ul style="list-style-type: none"> <li>• Grow easily</li> <li>• Easy to manage</li> <li>• Traditional Variety</li> </ul>	<ul style="list-style-type: none"> <li>• Good in color</li> <li>• Flavorful</li> <li>• Aromatic</li> <li>• Leaves are excellent for adding aroma, color, and taste to meals</li> </ul>
Australiano	<ul style="list-style-type: none"> <li>• Grow easily</li> <li>• Easy to manage</li> </ul>	<ul style="list-style-type: none"> <li>• Juicy</li> <li>• Aromatic bulb</li> <li>• Flavorful</li> </ul>

Local Markets

International Markets



Production area for demonstration in Tarlac and Nueva Ecija established



Market linkage meeting between possible buyer and farmers conducted



Preferential analysis among farmer cooperators, selected market links, and collaborators conducted



Facebook page (Onion InfoBlast) created

# Meet the UPLB Training Team

of the Communicating Agriculture and Fisheries for Inclusive and Sustainable Development under the Information and Knowledge Management Mentorship Program



**Dr. Nathaniel C. Bantayan**  
Project Leader, OVCRE



**Fides Marciana Z. Tambalo**  
Component Leader, OVCRE



**Dr. Elaine DC. Llarena**  
Mentor, CDC



**Dr. Edmund G. Centeno**  
Mentor, CDC



**Jyasmin Calub-Bautista**  
Mentor, CDC



**Reianne M. Quilloy**  
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**Charlene Mae Arkaina**  
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