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Banana macro-propagation: Crisis turned opportunity

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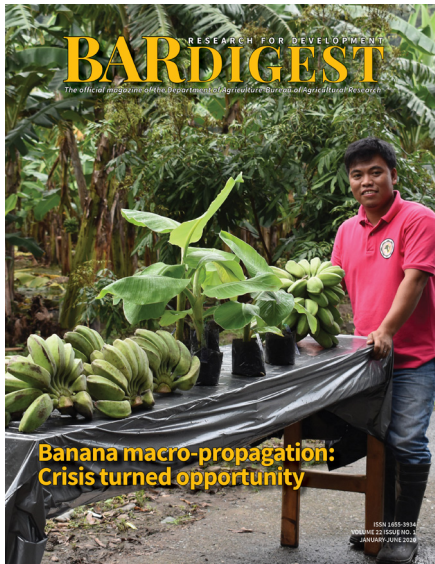


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ABOUT THE COVER

To improve the planting materials of banana specifically *Lakatan* and *Bungulan* varieties, the Nueva Vizcaya State University (NVSU) with funding support from DA-BAR, promotes the nursery-level application of banana whole corm macro-propagation through technology transfer from the university to the Balangon Integrated Growers Association Sawmill.

Wilson B. Oligo, NVSU project staff, showcases the harvested fruits and planting materials—project outputs. Behind him is one of the project areas where they planted the planting materials propagated through tissue culture and macro-propagation.

BAR R4D Digest is the biannual publication of the Department of Agriculture-Bureau of Agricultural Research (DA-BAR).

Previously published every quarter, this magazine contains feature stories on the latest technologies and breakthroughs in agriculture and fishery research for development (R4D) based on the studies and researches conducted by the member-institutions of the National Research & Development System for Agriculture and Fisheries (NaRDSAF).

The bureau was established to lead and coordinate the agriculture and fishery R4D in the country.

The editorial board welcomes comments and suggestions from readers. Reach us via our email acd@bar.gov.ph and our social media accounts [f](#) [i](#) [v](#) /DABAROfficial.

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Helping the agri- fishery sector amid health crisis thru R4D

Dr. Nicomedes P. Eleazar, *CESO IV*

The coronavirus disease 2019 (COVID-19) pandemic caused varied and complex negative impacts that placed both lives and livelihoods at risk. In the country, measures taken to prevent the spread of the disease greatly affected the food production system. Border closures and lockdowns disrupted the supply chain, thus, restricting people's access to sufficient sources of food and loss of income to producers.

To ensure the continuous supply of essential food commodities, the Department of Agriculture (DA) launched the Ahon Lahat Pagkaing Sapat (ALPAS) Kontra COVID-19 Program. Popularly known as Plant, Plant, Plant program, it is anchored on the department's New Thinking for Agriculture paradigm of collectively empowering farmers, fishers, agripreneurs, and the private sector to increase agricultural productivity towards attaining a food-secure and resilient Philippines with prosperous farmers and fishers.

In line with this, DA-Bureau of Agricultural Research refocused its research for development (R4D) programs, activities, and projects to support resiliency response toward transitioning to the New Normal and recovery of the agriculture and fishery sector.



PHOTO: RHERMOSO

Dubbed as the bureau's Resiliency Response Research for Development (3R) Program for the New Normal, the refocused DA-BAR program has six core subprograms that highlight the urgent need to utilize, upscale, and outscale production and post-production R4D technologies for optimal utility of the agri-fishery sector.

Technologies featured in this issue highlight the significant role that research plays in the agri-fishery sector, especially in these trying times. These are projects supported under the 3R program and refocused ongoing projects.

Nine of the eleven articles feature mature and adaptive technologies that created impact on the agri-fishery sector, especially to smallhold farmers and fishers. With the results of these past studies at the take-off point, new R4D projects under the bureau's 3R program are introduced.

These feature stories give emphasis to how the adoption and utilization of these R4D technologies addressed the urgent need for healthier food options and an additional income source — two of the biggest concerns today.

Three studies look into the utilization of R4D-generated technologies to boost production and ensure the quality of commodities specifically the use of laboratory-generated mature technologies.

Banana macro-propagation project highlights how the said technology can produce more and improved quality of banana seedlings in just a few months. With the same goal is the study on the production and use of tissue-cultured *ubi* planting materials.

While, another study delved into the use of epididymal sperm of slaughtered livestock for assisted reproductive techniques to produce more kids.

Lastly, one article features the upscaling and commercialization of virgin coconut oil, a product that is gaining much-deserved attention owing to its known medicinal and health benefits.

In this challenging time, the bureau recognizes the strategic position that it is in to elevate R4D toward making research more relevant and responsive to more people. ■

Pinoy GOURmix: Instant healthy hunger quick fix

Clarisse Mae N. Abao

The ongoing pandemic, inarguably, has immensely affected individuals from all walks of life, in all aspects. From fashion, public transport, work mode, and virtual classrooms, the pandemic took a heavy toll on the people's social and economic situation, and behavior.

In a crisis where there is limited movement due to quarantine protocols, accessibility and availability of goods have been a concern. Food, which is the basic necessity for all, is not an exception.

To minimize the risk of exposure to COVID-19, everyone was forced to stay at home limiting people with options on food deliveries and instant food, which has further gained popularity with the continuous demand for convenient goods and services, as per a study conducted by Michigan University marketing researchers in March 2020.

However tasty and easy-to-grab as it may be, instant food does not always offer the best nutrition humans should have. In facing a health issue, a strong immune system is a shield to combat the virus. And one of the best ways to keep our immune system intact is to maintain a healthy diet by consuming nutritious food.

The perfect healthy mix, instant noodles who?

A single serving of instant food, like instant noodles, basically contains carbohydrates, calories, saturated fat, and an unhealthy amount of sodium. This has always been a good enough reason why instant food is recommended to be taken in moderation.

Now, imagine a bowl made from milled rice, white corn grits, *adlay* grits enriched with *malunggay* powder, soybean texturized vegetable protein, ground

mungbean, and ginger turmeric. Most first impressions would say it would not be feasible to have all the said ingredients easily and deliciously prepared, but *Pinoy GOURmix* made it possible.

From the word 'gour' derived from gourmet that means high-quality food and 'mix' because it is a mixture of locally produced cereals, grains, grits, and other healthy ingredients, *Pinoy GOURmix* is a cheaper and complete smart food, high in protein and antioxidants, with 53 percent carbohydrates, 22.3 percent crude protein, 5.62 percent total fat, and 120 calories.

Enriched food, empowered farmers across the value chain

Taking inspiration from the US Manna Rice Pack, a food and disaster relief to address hunger and malnutrition in developing countries, Rose Mary Aquino, Department of Agriculture-Cagayan

Valley regional technical director for research and regulations and the project's proponent, led the research team behind the success of the product.

Pinoy GOURmix bagged the “Most Innovative Product” in the 10th Agriculture and Fisheries Technology and Product Exhibition in 2014. The award came with a research grant, giving the research team of DA-Cagayan Valley Research Center (CVRC) the opportunity to boost *Pinoy GOURmix*'s market potential through commercialization under the DA-Bureau of Agricultural Research (BAR)-funded project titled, “Packaging/Labeling Improvement and IPR Registration in Support to Promotion and Commercialization of Vegetable and Protein-based GOURmix Product in Region 2.”

As many ingredients are involved in the production, various farmers and farming communities in the Cagayan Valley region were tapped and capacitated to ensure the continuous production of raw materials and ingredients for *Pinoy GOURmix*.

White corn producers from Isabela and Cagayan, *adlay* growers in Dupax, Nueva Vizcaya, mungbean and soybean products in Isabela, and other local *malunggay* and yellow ginger farmers in the region were trained on organic farming and Good Agricultural Practices to ensure the supply of good quality and safe raw materials for product processing.

Apart from strengthening the farmers' capacities, partner manufacturers and distributors also

underwent training to improve their skills on proper product handling aligned to the standards set by DA-CVRC.

With a monthly estimated demand of 50,000 packs, *Pinoy GOURmix* provides a net income of PhP 4.25 per 250-gram pack, giving around 20 percent return on investment for the partner farmers and other stakeholders who engage in this profitable agribusiness venture.

Nation's recognized local instant *lugaw*

Due to its nutritional value, *Pinoy GOURmix* has been utilized on the feeding programs of both public and private institutions nationwide, earning a total of PhP 6.8 million net sales from 2014-2019.



How to prepare the *Pinoy GOURmix*?

1. Heat oil in a pot over medium heat and sauté garlic.
2. Add two liters of water along with the 250g pack of Gourmix.
3. Bring to a boil then stir and simmer for 15-20 minutes.
4. Season to taste.

Best served hot



PHOTO: ALKFI PROGRAM

Children eating the *Pinoy GOURmix* during the ABS-CBN feeding program in 2015.

Some of the major partner distributors outside DA agencies are ABS-CBN Programa GENIO, Jevita Sales and Marketing Corporation, Missionaries of Mary Mother of the Poor, Project PEARLS, Isabela and Quirino provincial local government units, and the Department of Social Welfare and Development. The product was also exhibited in mainstream locations such as SMX Convention Center.

On the onset of COVID-19, the local instant *lugaw* has also been distributed to medical health workers and frontliners in Tuguegarao City. It was also displayed for sale in DA KADIWA ni Ani at Kita marketing terminals and *pasalubong* centers established in various provinces in the Cagayan Valley region.

Seeing the potential of further upscaling the product, DA-BAR, through its Resiliency Response Research for Development Program, supported another phase of the project to be completed in 2022.

Titled “Upscaling and Sustaining Commercialization of Enhanced *Pinoy GOURmix* products,” the ongoing project being implemented by DA-CVRC targets beneficiaries from Providers Multi-Purpose Cooperative and DA-SOCCSKSARGEN, expanding the product’s reach from the north down to the southern part of the country.

DA-CVRC also plans to explore other variants of the product with *saluyot* and brown rice as ingredients.

As the Filipinos gear towards New Normal and continuously adopt new lifestyle and consumption behaviors, healthy food options such as *Pinoy GOURmix* can serve as one of the shields to enhance the Filipinos’ nutritional well-being as the nation faces its battle against COVID-19. ■

For more information:
Rose Mary G. Aquino
 Regional Technical Director for
 Research and Regulations
 Department of Agriculture
 -Cagayan Valley Research Center
 Ilagan City, Isabela
 ☎ (078) 622 0961
 ✉ roseaquino@yahoo.com



PHOTO COURTESY OF CBUENAVENTURA/PAENRO IFUGAO

Planting tinawon today

Chantale T. Francisco

Built with bare hands around 2,000 years ago by Ifugao ancestors, Banaue Rice Terraces is one of the landscapes that the Philippines takes pride in. With the steep contour of the four-tiered rice terraces, this structure projected a good strategy for rice irrigation up to the present. It became renowned and famous all over the world; thus, earning a great cultural and ecological value to our country.

But aside from the aesthetic it holds, what made the rice terraces valuable is it being the living proof of the Ifugao's profound indigenous knowledge and practices that were passed on from generation to generation. It was able to withstand the test of time and the technology they endorsed is still as effective as ever in housing different heirloom rice varieties in the region. But first, what is heirloom rice in the Philippine context?

Heirloom rice is a special kind of indigenous rice that is only endemic in certain regions in the Philippines. Apart from its exceptional taste and aroma, this kind of rice variety is highly resistant to pests, low maintenance when it comes to fertilizers, and adaptable to certain climatic conditions in the area. In Cordillera, over 300 heirloom rice varieties are present. But the most adored and in-demand among them is the *Tinawon* rice.

Also known as *Imbuucan* or *Tinglu*, *Tinawon* is a slow cultivating rice variety that grows once a year. It is best planted in the terraces because of its long-developed tolerance to cold and low fertilizer requirements because of the additional support provided by the paddy's water irrigation system. In essence, this kind of rice variety is originally grown for the farmers' consumption. But due to its growing popularity, it has established a niche in the local and global markets.

For those who have experienced *Tinawon* first hand, one can quite vouch for its taste and aromatic appeal. Studies also suggest that it has a high nutritional value which overall, makes it expensive with a selling price of about PhP 120 a kilo – almost 10 times the price of any regular milled rice.

Though the value of *Tinawon* is quite high in the market, its yield and productivity are low to sustain the farmers. It is also labor intensive and further requires regular irrigation maintenance. This greatly affected the revenue of the farmers, especially in this pandemic. Thus, considering the statistics, a project from the Provincial Local Government Unit of Ifugao, which focuses on upscaling and commercializing *Tinawon* products, is conducted.

Funded by the Department of Agriculture-Bureau of Agricultural Research (DA-BAR), this study titled, "Product Improvement and Commercialization of Processed *Tinawon* Rice," is an offshoot of the project "Product Improvement and Promotion of Coffee, *Tinawon* Rice, and Taro Products." Now focusing solely on *Tinawon*, this project believed that this will encourage

greater mass production of the said rice variety and would help uplift the income of the farmers.

In connection to Ifugao's rice farmers, DA-BAR has long been in aid of the community in forwarding intervention on *Tinawon* since 2011. Under its Community-based Participatory Action Research (CPAR), the project helped the production of *Tinawon* rice increase its harvest to supplement the demand of the export's volume and sustain the needs of our Ifugao farmers.

Dr. Catherine Buenaventura, supervising agriculturist of Ifugao's Provincial Agriculture Environment and Natural Resources Office, during the duration of the said CPAR project on *Tinawon*, said that the interventions introduced by the program endorsed a significant increase in the harvest of the farmers.

"These interventions led to a five percent increase in the production of *Tinawon* rice during the first cycle," she quoted.

But even with this success on increasing *Tinawon*'s production volume, the recent project on upscaling and commercializing *Tinawon*-based products was deemed as a necessary move by the project implementers. This is because, aside from rice exportation, value-adding technologies and products can help increase the income of the farmers and provide more livelihood opportunities in the community. With that being said, the products to be commercialized out of *Tinawon* will be cookies, choco chips, crackers, and rice wine. The processing of these products is in collaboration with

the Ifugao Heirloom Rice Producers Cooperative (IHRPC). This move is beneficial to the rice farmers of Ifugao as well since the raw *Tinawon* to be used by the processors will be directly sourced from them.

According to the project implementers, the production of wine will make use of local ingredients in Ifugao. *Binokbok*, a combination of glutinous rice and the weed, *önwad*, will serve as an organic yeast of the wine. Not all can make this organic yeast. As declared by the elders, only selected individuals can craft the yeast with precision, otherwise, it will not be as good as the authentic *Binokbok* of Ifugao.



Rice wine or *baya* is often used in rituals and celebrations. It has been produced and passed on by their ancestors. It became part of the tradition of Ifugao that it became a vital commodity that should be present in important events and ceremonies.

Meanwhile, the cookies and other products will also use an organically made *Tinawon* rice flour as its main ingredient.

The recent study seeks to enhance and upgrade the skills of its beneficiaries because of the increasing demand in *Tinawon*-based products. IHRPC already have experienced processors,

thus, an enhancement training will be conducted instead to further hone and improve the quality of the product. Moreover, training on Product Development, Good Manufacturing Practices, Food Safety, and Financial Management will also be conducted to ensure and sustain good practices during processing.

With the increasing demand on *Tinawon*-based products, 4,500 bottles of properly labeled rice wines; 3,000 boxes and 1,500 pouches of cookies; 3,000 boxes and 1,500 pouches of choco chips; and 3,000 pouches of rice crackers are the projected number of products to be sold for the whole duration

of the project. In the making of these products, the processors/beneficiaries will be involved from planning until the marketing process. This approach ensures that all the steps are beneficial to both parties, thus, encouraging a harmonious collaboration from its inception until its completion. ■

For more information:

Dr. Catherine V. Buenaventura
Supervising Agriculturist
Provincial Agriculture, Environment
and Natural Resources Office
Lagawe, Ifugao

☎ (074) 382 2063

✉ katbuenaventura3@yahoo.com

Native pork products in the new normal

Ma. Eloisa H. Aquino



The magnitude of the pandemic's threats resulted in restrictions in movement which hampered the entire food supply chain. With the enormous impact on food production and the economy, Filipinos like everyone in the world, try to adapt in order to survive and provide food for their families.

During these trying times, food availability and accessibility are among the country's primary concerns. But aside from these, Filipinos also look for nutritious food to help boost their immune systems. As there has been an increase in the demand for healthier options, it is interesting to note that healthier options can also be delicious options.

R4D initiatives on native pigs

A forefront livelihood in the rural areas of the country, native animal production is not labor- and resource-intensive. Native pigs, as well as native chicken, are mostly grown free-range and consume local feedstuff. Philippine native pigs are known to be resistant to pests and diseases and highly resilient to environmental stress.

Recognizing the opportunities that come with developing the potential of native pigs, the Department of Agriculture-Bureau of Agricultural Research (DA-BAR), since 2010, has supported a number of research for development (R4D) on native pigs. From research initiatives on boosting the growth and conservation of native pigs, several R4D projects were implemented

to develop technologies and commercialize native pig and its meat products.

Healthier and tastier native pork

Commonly known in its roasted form which is traditionally known as *lechon*, one of the country's popular dishes, the native pig has gained popularity in recent years as numbers of Filipino consumers have become health-conscious individuals. Aside from having lower cholesterol content, native pigs are said to be tastier and more flavorful compared to commercial pork.

As preference for native pig meat grew, R4D-implementing institutions, such as the Organic Agriculture R&D Center of the DA-Southern Tagalog Integrated Agricultural Research Center



PHOTOS COURTESY OF GBOCAYAN/DA-CALABARZON

(STIARC), embarked on the project titled, “Technology Development and Commercialization of Production System and Meat Processing from Organically Grown Native Pig and Native Chicken.” The project, led by Wilmer S. Faylon, was funded under the DA-National Organic Agriculture Program being coordinated by DA-BAR.

As a result of various R4D studies conducted, native pig can now be consumed in a variety of products aside from the conventional *lechon*. Thus, offering meat-loving Filipinos with healthier options for processed meat.

Continued development of native pork technology

In 2016, the said project supported the activities that aimed to increase

the income of native animal raisers through utilization and value-adding of meat from organically grown native pig, particularly the culled and castrated pigs.

Under the project, native pork carcass cutting was established to suit the small size and anatomy of the animal resulting in three primal cuts: ham, middle, and shoulder. Processed pork products developed include native pork *tapa*, native *longganisa*, native pork ham, and native pork *chicharon*.

“Most of the products utilized organically-grown ingredients such as herbs and spices to maintain the organic nature of the raw meat materials, which further enhanced the distinct and unique flavor of the meat. Processed meat from culled

native pigs was more flavorful than the meat from the younger ones,” Faylon shared.

The project provided support in product packaging and labelling, which gives the physical and sanitary protection and prevents dehydration and oxidation of fats and pigments, thus, extending the shelf life of the products. From manufacturing to distribution, the project team ensures that the set of sanitary guidelines recommended for compliance with Good Manufacturing Practices are met to ensure safe and food for human consumption.

These activities are being conducted in the meat processing laboratory established at STIARC of DA-CALABRZON in Lipa City,

Batangas that also served as a venue to showcase a start-up meat processing module.

Medium term effects and longer impact

A part of the Filipino diet, the meat processing industry has become a very profitable retail enterprise. An average of 63 percent increase in income was realized from the processing of native pigs.

“Through the project, we concluded that value adding can potentially increase the revenue of native animal farming communities. Native animal products can be positioned to the increasing niche market and health-conscious individual who are willing to pay higher prices at premium products,” Faylon said.

Information materials were produced including the book “Practical Guide in Raising and Value Adding of Meat From Organically-Grown Native Pig and Native Chicken” and booklets “*Gabay sa Pag-aalaga ng Katutubong Baboy*” and “*Katutubong Hain: Mga Lutuín Mula sa Karne ng Katutubong Baboy at Manok.*”

The team conducted a series of seminar-trainings and participated in trade fairs for information dissemination and technology transfer. Furthermore, campaigns from social media, television, and radio programs made the project widely-known and created linkages to complement livestock and organic banner programs of the region.

To date, seven adoptors are using the technology and output of the

project. They are from Quezon, Batangas, Cavite, Rizal, and Sorsogon.

Ways forward

With the success of the initially funded project, DA-BAR supported, under its Refocused Resiliency Research for Development Program on Upscaling and Diversifying Food Products/Technologies, the DA-CALABARZON project titled, “Commercialization of Developed Meat Products from Organically-Grown Native Pig in Batangas and Quezon Provinces.”

“Upscaling of production and processing would not only contribute to increasing availability of food supply but would also generate income of marginal farming communities. The production and processing would also create new job opportunities especially for women in each locality,” shared Ginalyn D. Bocaya, lead of the new project.

Furthermore, this is in line with the efforts of DA to ensure availability of supply and keep the farming community continuously running so that every Filipino will have access to affordable and nutritious food despite the threat of COVID-19.

Boosting the production of processed native pork provided people a healthier source of instant, accessible meat. To this end, increasing the availability of these processed meat is seen as an opportunity during the pandemic situation. Furthermore, given the success of completed and ongoing initiatives, the new project is expected to strengthen the production of food within the localities and provide

additional source of livelihood to communities.

“The cooperators will adopt the product formulation developed by DA-CALABARZON. With the upgrading of facilities, additional product lines such as bacon, ham, burger patties, *sisig* and different sausages such as hungarian sausage, cheesedog, and frankfurter will also be processed,” Bocaya shared.

Through the support of the Regional Agribusiness and Marketing Division of DA-CALABARZON, products will also be linked with the KADIWA market, LGUs and all potential institutional markets, resorts and restaurants, and cooperative outlets.

The presence of processing facilities established in Gumaca, Quezon, Nasugbu, and San Luis, Batangas further encourages native pig growers of Munting Sambayanang Kristiyano-Magsasakang Sinusunod ang Organikong Pagsasaka, San Luis Farmers Association, and First Nasugbu Natural Farmers Association and other native pig growers in Batangas and Quezon to expand their livelihood for increase *Ani at Kita*, and towards sustainable development. ■

For more information:

Ginalyn D. Bocaya

Science Research Specialist II
Research Division
Department of Agriculture-
CALABARZON

Marawoy, Lipa City, Batangas

☎ (043) 756 4962 | 981 2673

☎ (0961) 270 3859 | (0975) 331 6447

✉ ginadechavez@yahoo.com



Banana macro-propagation: Crisis turned opportunity

Clarisse Mae N. Abao

As the country's leading export fruit crop with four million metric tons of produce amounting to 1.9-billion-dollar revenue in 2019, bananas have made the Philippines the second largest banana exporter in the world. This export accounts for more than 20 percent of global banana shipments and is projected to continue for the next nine years due to high demand in Asian markets, the United Nations Food and Agriculture Organization claimed.

The Philippines' tropical climate is one of the major factors that nurture the growth of quality bananas in the country. Some of the varieties for domestic consumption and local market include *Lakatan*, *Latundan*, *Saba*, and *Señorita*. Cavendish type bananas

like *Bungulan*, *Grand Naine*, and *Tumok* are for exports reaching Japan, Korea, and the Middle East.

Majority of the crop is grown in Davao region, Northern Mindanao, and SOCCSKSARGEN with a share of the total production at 36.7 percent, 25.4 percent, and 12.4 percent, respectively; making Mindanao as the main island banana exporter nationwide.

With the banana's promising potential for income for its growers, specifically for smallhold banana farms, widescale production and improvement on the overall value chain on the other areas in the country should be explored through research for development (R4D), especially in improving the quality and quantity of its production.

PH banana industry in the pandemic

Engaging in banana production is not smooth-sailing venture as perceived. Apart from the diseases such as banana bunchy top virus (BBTV), banana mosaic virus (BMV), banana bract mosaic virus, and fusarium wilt as well as susceptibility to pests, the banana industry continuously faces tougher challenges as COVID-19 sets in the first quarter of 2020.

With the effects brought by the pandemic due to lockdown measures imposed causing limited workforce and impeded trade movement, the Philippines' banana export could drop by nearly 40 percent, almost half to around 2.5 metric tons this year, as claimed by the major producers of banana in the country.

Halted operations by major banana producers have immensely affected the industry. Despite Luzon as the initial center of the lockdown, a number of plantations in Mindanao also closed and implemented quarantine measures leading to slower production of bananas in the country's center island for production and export.

These problems, as may be alarming, are a challenge to agriculture R4D to innovate and prevent further

undesirable effects in the banana industry, especially to smallhold banana growers.

Farmers to thrive through macro-propagation

To enhance the productivity of smallhold banana growers, ongoing research on technology application initiated by the Nueva Vizcaya State University (NVSU) furthers the potential of producing quality planting materials through the whole corm macro-propagation of *Lakatan* and *Bungulan* varieties.

Banana whole corm macro-propagation is a technique for multiplying from a whole sucker pared, peeled, and scarified to induce lateral bud growth. Compared to tissue culture, macro-propagation is a more affordable technology that smallhold farms and farming communities can adopt as it employs locally available materials.

Under the Department of Agriculture-Bureau of Agricultural Research (DA-BAR) High Value Crops Development Program, the project titled, "Commercializing Whole Corm Macro-propagation Technology for *Lakatan* and *Bungulan*: A Viable Livelihood Option for Banana Farmers in Nueva



PHOTO: CI/TABAO

Vizcaya,” supported in 2019 aimed to promote nursery level application of whole corm macro-propagation technique through technology transfer from NVSU to Balangon Integrated Growers Association of Sawmill (BIGAS).

According to Dr. Elbert Sana, project leader, the technique helps the smallhold banana growers in Nueva Vizcaya in generating income and livelihood from banana plantlet production which farmers can accomplish by themselves at the nursery level.

To support the project, NVSU complements the technology with disease indexing service for BBTV and BMV to induce the growth of seedlings from healthy mother plants.

“One sucker [of *Lakatan* and *Bungulan*] can yield as much as 20-25 seedlings that can be ready for field planting in three to four months. With complementation of disease indexing for source mother plants, the whole corm macro-propagation technology can serve as a viable livelihood option for smallhold banana farms, specifically in Luzon, where only a number of banana tissue culture laboratories produce planting materials,” Dr. Sana reported.

Among the commendable project accomplishments is the partnership of NVSU with BIGAS for the capacity building of the BIGAS members in macro-propagation and proper nursery level management of cultivars to prevent low yield and high incidence of pests and diseases.

Moreover, the DA-BAR-funded project also assisted BIGAS in nursery enhancement by providing a greenhouse facility completed this year. The facility houses seven units of macrobed structures for plantlet production.

Rowell Dacanay, a 38-year-old member of the BIGAS Board of Directors, along with four other farmers, continuously benefit from the trainings of the project since 2019. Farmer beneficiaries like Dacanay replicate the protocol from NVSU on the project upgraded BIGAS Nursery from which other members of the association apply in their respective farms.

Taking steps towards macro-goals

To expand the institutionalization of the R4D initiative, the project team coordinated with the Local Government Unit (LGU) of Villaverde, Nueva Vizcaya





PHOTOS COURTESY OF ESANA/NVSU



and its Municipal Agriculturist Office from which they have gathered commitment to support the project implementation.

With the continued success of the macro-propagation technology on *Lakatan* and *Bungulan*, DA-BAR has recently supported a related NVSU project titled, “Enhancing Tissue Culture and Macro-propagation of *Saba*: Cagayan Valley’s Planting Material Support System for Banana” under the Resiliency Response R4D (3R) Program this 2020.

On a similar goal, the second project will focus on upscaling the production of quality planting materials for *Saba* through both tissue culture and macro-propagation technologies. The new project is currently being implemented in partnership with Quirino State University and DA-Cagayan Valley Research Center.

From the initial one farmer association on the first project, the second phase now reaches out to the Bayombong LGU banana nursery, Quirino Banana Growers Association, Sustainable Crop Production Sloping Area farmer members, and nine selected smallhold banana farmers in Nueva Vizcaya as partners.

Aligned with the DA’s Plant, Plant, Plant Program or Ahon Lahat Pagkaing Sapat (ALPAS) Kontra COVID-19 Program and the National Agriculture and Fisheries Modernization and Industrialization Program 2020-2025, the DA-BAR 3R Program through its the Support to Mass Production of Quality Planting Materials subprogram aims to increase the production of quality planting materials through the utilization of mass propagation techniques and protocols that help sustain food production, availability, and accessibility in the country. ■

For more information:

Dr. Elbert A. Sana

Director

Citrus Resource Research Development Center

Nueva Vizcaya State University

Bayombong, Nueva Vizcaya

✉ tombysana@yahoo.com

Ubi mass propagation upped through tissue culture in Bohol as pandemic spreads

Jhon Marvin R. Surio

Ubi (*Dioscorea alata* L.) or purple yam is commonly known in the country as the main ingredient in the all-time favorite dessert, *halayang ubi*, during fiestas and holidays. It is also considered a must-have to complete a traditional *ginataan* recipe. Over the years, *ubi* gained more popularity as a local favorite with its versatility as flavoring to various food products like sweets, drinks, and pastries.

Along with other crops, *ubi* is one of the country's banner export crops

that is recently gaining popularity in terms of crop production. It is a slender creeping vine, with a peculiar four-winged stem. Currently, it is already commercially grown in the country.

According to researches, demand for *ubi* in the country reaches as high as 49,000 tons a year for processors and 13,000 tons for export abroad. Exported purple yam products include those in powder form, ice cream, dried chips, and many other industrial products.

Aside from the crop's economic benefits and market potentials, its known health benefits also remain unmatched with it being a great source of carbohydrates, potassium, Vitamin C, and antioxidants that is said to help regulate blood sugar, lower blood pressure, and improve symptoms of respiratory conditions. As a result, demand for *ubi* increased for about 10-20 percent annually in recent years, especially in countries like Australia, Canada, Taiwan, Japan, and even in the US.



In the Philippines, Bohol was identified to be the largest *ubi*-producing province, contributing more than half of the 66 percent in the country's total production volume that comes from Central Visayas.

As such, several initiatives on *ubi* research and development had been undertaken and funded by the Department of Agriculture-Bureau of Agricultural Research (DA-BAR) in the past. In 2003, an *ubi* agribusiness development project was launched to strengthen the industry in the province. Through the project, many farmer-cooperators profited from *ubi* farming as an alternate crop to corn and legumes.

Another project looked at technology promotion, utilization, and commercialization of *ubi* which led to the identification of technology for commercialization of *ubi*-based products. Through this project, *ubi* products were made available in Bohol markets.

However, agricultural researchers from the region noted that the potential of this commodity is still not being fully tapped in terms of local production, utilization, and marketability because of the lack of quality planting materials in the region.

Hence, the project titled, "Support to Mass Production of *Ubi* Quality Planting Materials through Mass Propagation Technique in Bohol Province," funded under DA-BAR's refocused program in response to the urgent threats to the country's food security posed by the ongoing health crisis.

The project aims to address challenges observed due to the

occurrence of long dry spells and disease infections ultimately leading to the scarcity of quality planting materials in the said region.

Atop the boasted functions of the regional agriculture office is its prioritization of the production of quality planting materials. Annual production of yam seed pieces is tagged under the High Value Crops Development Program for distribution to farmer growers residing in Bohol. Despite efforts, the problem in the lack of quality planting materials still stands, resulting to low yield as affected by pests and diseases.

With the pioneering of the project, the production and use of tissue-cultured planting materials is given further support to address the gaps identified, and hopefully boost the production of *ubi* and increase the income of farmer growers in the region.

Researchers in the region have recently perfected the use of tissue-cultured planting materials by using nodal segments of stems of the plant multiplied *in vitro*. Results were utilized in the production of first stage tubers for distribution as planting materials, taking into consideration that smaller tubers are yet produced from the plantlets grown in the laboratory.

In vitro preservation and conservation of different accessions collected from the province and within the region is continuously done in the Plant Tissue Culture Laboratory of the station, bringing light to the aspirations of the project.

To kick off the collaboration between DA-Central Visayas and

DA-BAR, a ceremonial planting and turnover ceremony was conducted in the municipality of Jagna, Bohol, spearheaded by Atty. Salvador Diputado, regional technical director.

A total of 250 tissue-cultured *Ubi Kinampay* plantlets were given to the local government unit (LGU) of Jagna, making it the first LGU-recipient of the support grant provided by DA-BAR to finance the accelerated production of good and quality planting materials in the region.

According to Diputado, the project aims to produce at least 20,000



quality planting materials to be distributed among farmers from 10 different municipalities in Bohol.

The *Ubi Kinampay* variety was specifically selected because it is the most preferred purple yam and widely grown in the province of Bohol. Furthermore, the *Kinampay* variety commands the highest price among others at PHP 90 per kilogram, compared to the white variety which can be sold at PHP 35 per kilogram, and lesser purple variety at PHP 45 to 65 per kilogram.

Previous research projects conducted by the regional office have developed various products

from *ubi* such as *ubi* powder, yam flour, yam chips, *ubi* wine, spread, and chips.

As of June this year, the project already set out initial planned activities. Approximately 50 pots were already planted with *Ubi Kinampay* variety (for source of explants in the micro-propagation activities) and some representatives from *ubi* farmers association signified interest in taking part in the said project. Moreover, about 400 pieces of nodal segments were already collected, sterilized, and inoculated from which planting materials will be developed.

DA-BAR has been actively supporting various initiatives on mass production of *ubi* quality planting materials through its National Technology Commercialization Program and High Value Crops Development Program. ■

For more information:
Dr. Fabio G. Enriquez
Chief
Research Division
Department of Agriculture
-Central Visayas
Maguikay, Mandaue City
☎ (032) 268 9805
✉ fabsyam2004@yahoo.com



Mushroom for livelihood and health

Chantale T. Francisco

Mushroom growing and propagation is an overlooked industry in business and commerce. Though it has sprung as a feasible livelihood due to its low-cost start-up and efficiency, it was still not cultivated enough because of the lack of resources, training, and guidance of experts. But in these trying times, mushroom propagation became a popular venture for urban agriculture.

With the shock and heightened distress that the pandemic brought us, considering mushroom growing and production as a business pursuit can be a good income-generating activity for those who wanted to invest in something sustainable without breaking the bank.

With the aid of the Department of Agriculture (DA), the DA-Bureau of Agricultural Research (BAR), in line with its commitment to support and uplift the lives of farmers and fishers, created a program that highlights the right measures and urgency of ensuring food security amid the pandemic. With that, research for development agencies have been refocusing and reinforcing their projects to support DA-BAR's current initiative.

One partner agency is the DA-Central Luzon Integrated Agricultural Research Center (CLIARC) that focuses on boosting mushroom propagation technology. With their current project titled, "Upscaling of Mushroom Crackers as Additional Income Source of Indigenous People in Caranglan, Nueva Ecija in Support to ALPAS-COVID 19," CLIARC believed that this would help the Binbin Igorot's Association, mushroom growers, and processors increase their income by 50 percent through the mushroom processing technologies developed by their agency. Funded by DA-BAR, this project can help enhance the skills and productivity of the beneficiaries and can also pave the way to the adoption of a healthier snack alternative.


This project is one of the installments of DA-Central Luzon's main study on mushroom production titled, "Product Development and Shelf-Life Extension of Pleurotus Mushroom Processed Product Categorized into Frozen Foods, Condiments, Sauces, Sweets, and Pastries." From its inception in 2015, 30 mushroom-based products were produced which greatly helped uplift a lot of lives until now.

The beginning of it all

With the main goal of generating and introducing low-cost mushroom production and technologies to rice farmers, the main study's results have indeed come a long way since then. Through DA-BAR's support, a successful food product line on mushrooms was created through the said study.

Marketed as snacks that do not only give consumers fulfillment in taste but also in nutritional content, this project has 10 frozen product varieties that include ice cream, ice drop, *kikiam*, *bola-bola*, nuggets, veggie-balls, *longganisa*, *tapa*, dumpling, and *lumpiang shanghai*. Moreover, another 10 mushroom-based products are dedicated to sweets and pastries. These are waffle, cupcake, *espasol*, macarons, pie tart, *pandesal*, brownie, sugar-coated mushroom, glazed mushroom, and *maja*.

And of course, to complete the product line, mushroom-based condiments were also developed by the project implementers. Under the substudy, "Incorporation of Pleurotus Mushroom on the Processing and Development of Condiments, Mixes, and Sauces for



Community-Based Enterprises,” mushroom ketchup, pickle relish, gravy, chili paste, fish ball sauce, mayonnaise, sweet chili sauce, hot sauce, and barbecue sauce were developed.

In these products, fresh oyster mushroom fruits were harvested and processed to be incorporated in these goods. And to ensure its marketability, the project implementers conducted a sensory evaluation survey to gauge the people’s interest in the product taste-wise. Fortunately, the product line garnered positive feedback from the respondents and has also been commended for the presentation, texture, and varieties of flavor available.

The said project has successfully provided additional income to rice farmers, particularly those who are already engaged in mushroom propagation. During this pandemic where additional income is much needed, this accomplishment sparked the interest of the project implementers to venture on another merchandise that will add flavor and crunch to the product line. Hence, the emergence of mushroom crackers.

Forwarding a healthier cracker alternative

Deemed as a healthier complimentary cracker, mushroom crackers are “deep-fried puffed crackers made from fresh oyster mushroom and vegetable flour,” as defined by the proponents. With its crunchiness and taste that resembles existing commercial crackers in the market, this product is a promising cracker alternative because of its added vitamins and minerals especially for those who are monitoring their health.

The project implementers have this vision to upscale and stretch its commercialization initiatives in DA’s Kadiwa ni Ani at Kita markets and other cooperatives. To boost its presence and linkages, the project implementers would also like to take advantage of social media for marketing and promotions.

A total of 48,000 packs are projected to be produced in this installment. Four thousand eight hundred will be distributed to the less privileged, 4,800 for the frontliners, and another 4,800 to the funding agency. The rest of the mushroom crackers are meant to be sold for

the income of the beneficiaries. The production, of course, will be accompanied by hands-on training on the mushroom crackers processing technology and also training and assistance on Good Manufacturing Practices to ensure food quality.

Together with the mushroom cracker project, DA-Central Luzon has also been active recently in forwarding other initiatives for the department’s program. One of them is the project titled, “Support to Mass Production of Mushroom Quality Planting through Mass Propagation Protocol in Central Luzon.” This aims to increase the production of quality mushroom pure culture, grain spawn, and fruiting bags by incorporating mass propagation techniques and protocols.

Early on, DA-Central Luzon was also known to be distributing spawn and fruiting bags to community members and associations through its research outreach stations located in Pampanga, Tarlac, and Zambales. Furthermore, with the public’s growing interest in mushroom production and

propagation, the Mushroom Technology Development Center under CLIARC in Paraiso, Tarlac City has also launched a webinar on mushroom production through the center’s official Facebook page.

Being resilient keeps us afloat during this pandemic, but what can sustain our buoy is every agency’s concerted initiatives and contributions especially for our farmers and fishers. That is why mushroom growing is ideal for those who want to invest in a business that needs low-cost materials and a small space to start on. Aside from being an additional source of income, growing mushrooms can also serve as an efficient food source because of its nutritional value and properties. This can, indeed, help alleviate the threat to food security. ■

For more information:
Dr. Emily A. Soriano
Agricultural Center Chief III
Department of Agriculture
-Central Luzon Integrated
Agricultural Research Center
San Fernando, Pampanga
☎ (0906) 245 0622
✉ easoriano30@gmail.com





Healthy chevon food amid the crisis

Ma. Eloisa H. Aquino

“In any scenario, the most affected are the poorest segment of society. Developing countries like the Philippines are particularly at risk as this pandemic can lead to the reduction of the labor force and affect income and livelihood as well as labor-intensive forms of production such as agriculture and

aquaculture,” said Dr. Jonathan Nayga, director of Isabela State University-Cagayan Valley Small Ruminants Research Center (ISU-CVSRRC).

“Furthermore, food demand in poorer communities is linked to income; and when the loss of

income-earning opportunities strike, consumption will suffer. Hence, if this will continue, it will lead to poverty, hunger, and malnutrition,” he added.

With this in mind, the university has pulled efforts to bring together the food manufacturing industry,

retailers, raw material producers (goat raisers), cooperatives, local government units as partners in commercialization, product distribution, source of raw materials, and farm monitoring to ensure animal fitness for human consumption. To them, commitment and collective efforts from government agencies must be rolled into one, amid the crisis being faced, to help goat raisers in rural communities sustain not only livestock-based enterprise, but also adequate, accessible, available, and affordable healthy food to every Filipino.

Aside from the COVID-19 pandemic situation, the processing of chevon meat products can offer an alternative source of meat during emergency situations, like the occurrence of African swine fever and avian influenza, that have affected the swine and poultry industry, respectively.

Chevon as the healthiest nutrient source for red meat

Filipinos are meat-loving individuals but considering the increasing number of health-conscious consumers, healthier sources of meat have been introduced and are slowly gaining popularity.

Among pork, beef, chicken, and lamb, chevon is considered to be the healthiest source of dietary protein, fat, vitamins, and minerals. Chevon has lower fat, saturated fat, and cholesterol content and higher in polysaturated fatty acid. Fat level content analysis revealed a lower than recommended fat intake for adults (44 to 77 grams daily).

“As consumers became aware of the health risk of consuming too much red meat, the demand for chevon increased both in the local and global markets. Furthermore, developing processed meat products with high nutritional value is feasible,” Dr. Nayga said.

Post-production innovation

In the Philippines, the Northern Luzon has traditionally consumed goat meat as part of their local tradition. Specialty goat cooked dishes such as *kaldereta*, *kilawin*, *pinapaitan*, and *sinampalokan* have been part of special occasions or regular family meals.

In 2015, the global per capita consumption of meat increased from 23.1 to 42.2 kilograms as presented in the project document. From the conventional per head basis/live animal disposal and

either consumed fresh, chilled, or frozen, ISU has developed ready-to-eat products as a result of post-production innovation through the developed canned chevon processing technology. Duly registered and approved by the Intellectual Property Office of the Philippines, the developed package of technology includes standard product formulation and thermal processing schedule.

This was made possible through the support given by Department of Agriculture-Bureau of Agricultural Research (DA-BAR), through its National Technology Commercialization Program, on the project titled, “Commercialization of chevon value-adding technologies in the Province of Isabela,” on top of the different research for development projects supported by the bureau from goat production to processing.

“The project has developed post-production product from goat and improvement of marketing system for chevon,” Dr. Nayga shared.

Through the center’s chevon value-adding/processing technology, nine more products were produced. These include the canned products,

which were inspired by Filipino native dishes, *sinampalokan* (goat's happy feet), chevon curry with peanut, chevon *mechado*, chevon *asado*, chili-garlic chevon, and pounded chevon with sauce. On the other hand, microwaveable packaging products include chevon meat balls, chevon with white sauce, and chevon ribs with chestnut sauce.

“The demand for such products resulted in the introduction of product retailing. Through value-adding, more products can be offered to the consumers, thus, retailing scheme can be more attractive. As retailing of product is established, raisers are encouraged to rear more as the market becomes stable,” Dr. Nayga explained.

On average, ISU's current volume of production can produce 10,000 cans annually. Marked at 200-gram net weight per can, canned products are sold at PhP 190. With an investment cost of PhP 2,086,250, the chevon processing can result to 31 percent ROI from an average annual net income of PhP 938,750. This is based on an annual sales volume of 11,750 cans and 1,400 vacuum-packed cuts (at 1 kilogram per pack) produced.

Upscaling and sustainability

DA-BAR, under its refocused Resiliency Response Research for Development Program on Upscaling and Diversifying Food Products/Technologies, has supported the new project titled, “Commercialization of Chevon Canned Products: A Support to DA-ALPAS Kontra COVID-19 Program,” and also in line with DA's twin goals: *Ani at Kita*.

The project is geared towards upscaling the canned products, chevon curry, pounded chevon, and chevon *mechado*. Furthermore, the project shall contribute to the establishment of a market for locally produced chevon meat products from the developed post-production technology for goat, hence, ensuring standardization of products for commercialization.

The products will be distributed through technology/product commercialization partners of ISU-CVSRRC in local and inter-region coverage; and in Central Luzon, Metro Manila and CALABARZON through the ISU-Multi-purpose Cooperative and the DA-Cagayan Valley's KADIWA Market.

“With product commercialization, the goat industry will also be developed as the number of commercial-level farms increases. The transformation from backyard to commercial-level of production is needed to sustain the growth of the market being established. As the market of animal is established, profits from raising goats become stable. Livelihood in rural communities will be created, thereby creating a stronger domestic economy,” Dr. Nayga shared.

On sustainability, the team aims to establish a private partner/company that will commercialize the technology through license agreement. The technology generator shall ensure the provision of training and other technical assistance until operation becomes stable under private management. ■

For more information:

Dr. Jonathan N. Nayga

Director

Cagayan Valley Small

Ruminants Research Center

Isabela State University

Echague, Isabela

☎ (0921) 318 1621

✉ jnn_060369@yahoo.com

Kids born out of butchered goats

Rena S. Hermoso



Epid bucks, 1916
fixed time artificial

Did you know that sperm from a butchered goat when harvested and stored properly could still fertilize a mature oocyte?

I bet you wondered if a dead goat could still father a live kid. The answer is yes. In Nueva Ecija, goats born from the epididymal sperm are fondly called *epid* by the research team that brought them to life. These *epid* bucks are now entrusted to farmers to breed their backyard does, and produce goats that are a better version of their parents. With this, farmers could augment their income faster.

Testing the hypothesis

Dr. Lerma Cajugan-Ocampo, senior science research specialist at the Department of Agriculture-Philippine Carabao Center (DA-PCC), eagerly tested her hypothesis that sperm from a butchered goat could fertilize a mature oocyte through a project funded by DA-Bureau of Agricultural Research. She was driven by the desire to include frozen germplasm from native farm animals and endangered and endemic ruminants in PCC's cryobank core collection.

Nondescript goats are usually found tethered in lush vegetation.

With its inherent resiliency in a harsh environment, native goats reproduce with ease albeit smaller than foreign breeds, thus, providing instant cash for farmers in need. With this, goats usually end up at slaughterhouses before reaching sexual maturity.

Dr. Ocampo wondered if she could collect live sperm from a butchered goat. Her background in veterinary medicine pushed her to think that in theory, it is possible. Using goat as an animal research model, she and her research team explored possible procedures to extract a viable epididymal sperm from post *mortem* goat testicles.



1902 and 1902, are two of the goats born thru artificial insemination using epididymal sperm.

Epididymal sperm (1902) kids

They found that indeed live sperm could still be collected from butchered goat within 30 minutes to two hours upon death. Through *in vitro* fertilization technique, the post *mortem* epididymal sperm was able to fertilize *in vitro* cultured eggs demonstrating that the sperm remains physiologically fertile. Shortly after, freeze preservation trials for epididymal sperm were optimized at -196 degrees Celsius.

Moving a step forward

Surprised by the result of their study, Dr. Ocampo and her team implemented another BAR-funded project as a follow-up. This time

to determine the fertility *in vivo* of frozen goat epididymal sperm through artificial insemination in two distinct seasons — wet and dry.

For the experiment, does were injected with hormones to synchronize the estrus or ‘in heat’ phenomenon. Those who were responsive to the hormone were inseminated with the processed frozen epididymal sperm. Thirty days after the artificial insemination, does underwent ultrasonography to determine if it were pregnant.

In the first trial, two out of the nine hormone-responsive does got pregnant using a simple estrus synchronization procedure. Unfortunately, both does aborted after 45 and 55 days respectively. Research team attributed this to the extreme humid condition.

The following three trials utilized a better hormone priming method called ovulation synchronization protocol for fixed-time artificial insemination. Thirteen out of the 25 does that were inseminated got pregnant. Twenty-one epidid kids were born.



PHOTOS COURTESY OF JOLOFRANCO/DA-PCC

“To the best of our knowledge, this is the first-ever reported case in the Philippines demonstrating that post mortem testicles can be a valuable source of germplasm (sperm) for freeze preservation and its eventual use to produce offspring in the Philippines using fixed-time artificial technology (FTAI),” shared Dr. Ocampo.

Out of curiosity, the research team continued to monitor whether the *epid* kids could also reproduce once they reach sexual maturity. These *epid* bucks were crossbreds from Boer and native goats. Through natural mating, the *epid* bucks were able to produce their kids.

Taking a detour

In mid-2020, the research team had to refocus their project to aid livestock farmers amid the economic repercussion of the extended community quarantine implemented across the country to curb the spread of COVID-19.

Through the project, PCC in partnership with the city government of San Jose launched the Buck to Bucks (B2B) Paiwi System in Nueva Ecija to help farmers augment their income. Under this system, an *epid* buck with 50 percent Boer bloodline was entrusted to a partner-farmer to breed their does.

Lolito Deloberjes, Jr. was chosen to initially model the B2B Paiwi System. Similar to the project’s experiment, does also underwent ultrasonography to identify which were eligible for breeding and were injected with hormones to induce estrous.

“Estrus synchronization technology using either a single dose of cloprosenol or lutalyze hormone will be rolled over as a mature technology optimized at the PCC-Reproduction and Physiology Section in order for the female goats in the barangay to come in heat in a predetermined period and

will be naturally bred by the buck,” said Dr. Ocampo.

After 30 days, the research team will determine if does got pregnant through another ultrasonographic examination. Once they are declared pregnant, the *epid* buck will be entrusted to the next farmer in the community.

To aid more farmers during this health crisis, *dikong epid* was entrusted to another goat farmer in Science City of Muñoz. Farmer-members of the Tayabo Agro-Entrepreneur Natures Innovators Movement and the Pantawid Pamilyang Pilipino Program (4Ps) beneficiaries will be the recipients of the B2B Paiwi System. ■

For more information:
Dr. Lerma Cajuigan-Ocampo
 Senior Science Research Specialist
 Department of Agriculture
 -Philippine Carabao Center
 Science City of Muñoz, Nueva Ecija
 ☎ (0923) 274 7527
 ✉ ocampolerma040661@gmail.com

RiceBIS: A strategy to enhance adoption of updated rice tech

Jireh Alodia R. Laxamana

Still reeling from typhoons and drought that hit the country, smallhold rice farmers face a new hurdle. The nationwide preventive lockdown to curb the spread of COVID-19 restricted the movement of food and goods. Thus, bringing food from the farm to tables have become more challenging. Rice farmers' lives and means of living are at risk thereby threatening food security and sustainability.

This major problem requires an innovative solution through relevant research for development (R4D) interventions. As the lead rice R4D institution, the Department of Agriculture-Philippine Rice Research Institute (DA-PhilRice) initiated the RiceBIS project to improve the competitiveness of rice and rice-based farming communities in select provinces in the country.


About the project

Funded by DA-Bureau of Agricultural Research, the RiceBIS Phase II involves 15 RiceBIS communities with 10 clusters of farmer organizations each to cover 400 farmer-beneficiaries per site. This includes 12 major rice-producing provinces: Ifugao, Ilocos Norte, Pangasinan, Quirino, Tarlac, Zambales, Quezon, Masbate, Aklan, Negros Oriental, Cotabato, and Agusan del Norte.

Anchored on the clustering approach, the RiceBIS Community Program aimed to address low productivity and income among local farmers through a modern approach in line with DA's twin goals.

To promote rice farming modernization and rice-based

enterprises improvement through the distribution of matured technologies, RiceBIS project merges production and marketing strategies to transform farming communities to become market-driven and participatory through the promotion of livelihood programs and climate-smart farm technologies.



Aerial mapping and geotagging in Mangatarem, Pangasinan

The technologies under the RiceBIS project include yield-enhancing and cost-reducing technologies anchored on the PalayCheck system, Palayamanan, and clustering approach. Through which series of training, promotion, and demonstration are conducted through Farmers' Field School (FFS) including organizational development and agripreneurship.

RiceBIS technologies

The clustering approach primarily aims to facilitate community collective action such as synchronous crop establishment and harvesting using farm machines, mobilization of farmer leaders, and group marketing. This approach will serve as a strategy to enhance the adoption of yield-enhancing and cost-reducing technologies.

To improve resiliency and achieve sustainable agro-enterprise,

the RiceBIS program conducted clustering activities this year across all selected project sites in the country.

PalayCheck for production technologies contributed significantly in the increase of production and profitability of rice farming in the country. It has been proven to help farmers achieve high yield through proper rice crop and technology management as long as key check recommendations (e.g. high-quality seeds, proper water, nutrient, and pest management practices, land preparation, among others) are ensured. Such developed practices opened opportunities, improved the livelihood, and increased the income of smallholder rice farmers.

Meanwhile, farm diversification and integration are being promoted especially in rainfed areas through the Palayamanan technology

platform. Cropping patterns, ecosystems, and resources play a big role in the implementation of this technology. It solved concerns on monocropping by having other sources of livelihood such as planting vegetables and fruits while raising livestock and fishpond for continuous food supply, increased farm productivity, and improved ecological balance or diversity. Hence, achieving food security and economic stability.

As of writing, the PalayCheck for production technologies is further being disseminated to RiceBIS farmers through various FFS and establishment of technology-demonstration sites. These rice technologies, which the farmers can adopt in their community, will be showcased in learning fields.

RiceBIS and other initiatives

Different project implementers conducted various initiatives in



selected RiceBIS sites in the country. Other activities held through the said project included project briefing, focus group discussion, site validation through aerial mapping and geotagging, cooperative inspection, and establishment of more techno-demo sites. Further, a ceremonial seed distribution of bags of certified seeds from the Rice Competitiveness Enhancement Program for the farmer-beneficiaries was also launched.

Turning the pandemic into an opportunity to identify and address vulnerabilities in the country's food systems while improving the competitiveness of farming communities to a sustainable agro-enterprise, DA-PhilRice through the technologies under the RiceBIS Community Program aims to make rice farmers resilient and bring transformation to society in line with the New Normal for a much better post-pandemic scenario.

Further, DA-PhilRice added that its plans for the second semester include the conduct of postharvest losses data gathering, establishment of technology demonstration sites and RiceBIS communities, and partnership-building with rice stakeholders. ■

For more information:

Dr. Aurora M. Corales
Chief Science Research Specialist
Department of Agriculture
-Philippine Rice Research Institute
Science City of Muñoz, Nueva Ecija
☎(044) 456 0277 local 511
✉am.corales@philrice.gov.ph

Jayca Y. Siddayao
Senior Science Research Specialist
Department of Agriculture
-Philippine Rice Research Institute
Science City of Muñoz, Nueva Ecija
☎(044) 456 0277
✉jy.siddayao@philrice.gov.ph

References

- Philippine Rice Research Institute. (2014). PalayCheck System for the Philippine Irrigated Lowland Rice. Retrieved from <https://www.pinoyrice.com/palaycheck/>
- Philippine Rice Research Institute. (2014). Palayamanan System. Retrieved from <https://www.pinoyrice.com/palayamanan/#squelch-taas-accordion-shortcode-content-1>
- Philippine Rice Research Institute. (2020). Rice Business Innovations System (RiceBIS) Community Program Progress Report (January–August 2020) and Briefer.
- Philippine Rice Research Institute. (2020). Rice Business Innovations System (RiceBIS) – Phase II and Expansion Site. Jan-June 2020 Summary Report and RiceBIS Expansion Sites Progress Report.
- Sinon, B.J. (2019). Palayamanan Plus, a Way to Sustainability. ATI in Eastern Visayas. Retrieved from <https://ati.da.gov.ph/ati-8/news/04102019-1005/palayamanan-plus-way-sustainability>



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VCO as catalyst for women empowerment in Quezon province

Jireh Alodia R. Laxamana



As one of the leading suppliers of various coconut products, it is no surprise that Philippines has large areas planted with coconut. One of those is Quezon province which contributes 86 percent share in the CALABARZON's coconut production — making it the top producing province of various agricultural products in the said region (Philippine News Agency, 2019).

Data from the Philippine Coconut Authority (2019) shows that 68 out of 81 provinces in the country are abundant with coconut trees. Thus, making it possible to support a million population of coconut farmers, especially women, with various livelihood opportunities.

Wide-range benefits of VCO
With hectares of coconut plantation,

the Quezon province pays homage to the commodity as one of the defining aspects of their culture as portrayed every Niyogyugan Festival in the province. Had it not been for the health crisis, the week-long festival should have taken place in August when local and tourist could have gathered around coconut-themed booths by local farmers and entrepreneurs.



PHOTO COURTESY OF DBIHIS/DA-CALABARZON

Each booth would be presenting their town's famed delicacies, accompanied by pleasing designs and music.

With everything else put on hold, Quezon province continued its initiatives in processing, promoting, and commercializing various coconut products. Among those products is the Virgin Coconut Oil

(VCO) that is considered as the most profitable product owing to its wide range of uses for hygiene, cosmetics, and health.

Initial studies have been conducted by different government and non-government institutions on the medicinal properties of VCO with regard to the fight against the coronavirus disease 2019.

A local study under Team Asia Corporation showed that VCO, when incorporated into medical frontliners' daily diet, could decrease allergic symptoms, fewer palpitations, less hyperacidity, improved bowel movement, better sleep, and increased energy (San Juan, 2020).

Citing the context of their province, the Department of Agriculture-Quezon Agricultural Research and Experiment Station (DA-QARES) highlighted that “according to various literature, other benefits [of VCOs] include anti-microbial properties, antidiabetic, anticancer, anticaries, and possess disinfectant activities. VCO was found effective against viruses with lipid coating (e. g. HIV, Hepatitis C, influenza); effective against bacteria and fungi. This anti-viral property is now being tested by several institutions against the COVID-19 to address the current pandemic.”

Thus, to aid in their province’s response to the crisis, DA-CALABARZON through QARES reintroduced and showcased their VCOs through a project funded by the DA-Bureau of Agricultural Research in line with its Resiliency Response Research for Development Program for the New Normal.

Uplifting the province’s women coconut farmers and frontliners

Through the project titled, “Strengthening Rural Women’s Livelihood: Commercialization of Virgin Coconut Oil (VCO) in Quezon Province,” QARES distributed VCOs for free to 50 health workers, 19 firefighters, 55 police officers, and 12 members of the Municipal Disaster Risk Reduction and Management Office.

To become productive partners in the development of the community

and to uplift their quality of living, the project empowers women coconut farmers as proactive members in the process of preparing, processing, and marketing various agricultural products.

QARES tapped the CABAYAN Rural Improvement Club of Barangay Cabay as its research partners and project beneficiaries prior to the distribution of VCOs to the province’s frontliners.

Organized in 1994, the all-women group with 35 members was chosen because of their various livelihood projects for the economic improvement of households in their community. As a new source of income, the VCO production of the group is continually enhanced in terms of quality and quantity. To help enhance production, capacity building activities on improved processing and packaging technologies and equipment availability are offered through the project.

More VCOs from and to more partners

More VCOs will be distributed soon to frontliners in other areas to help ease the effects of the health crisis. To increase VCO production, technology transfer to other women group is also among the activities in the pipeline. QARES also plans to establish two more market linkages. Production promotion through social media and joining KADIWA markets are eyed as well.

Through this project, one can see how research for development (R4D) initiatives could serve as intervention and driver of the development sector in the country. In line with the department’s twin goals, QARES said that this intensified participation of women in the agriculture sector could further promote inclusivity and development in coconut-growing communities. ■

For more information:

Dennis D.L. Bihis

Science Research Specialist II
Department of Agriculture
-Quezon Agricultural Research
Experiment Station
Tiaong, Quezon
☎ (042) 585 7101
✉ dennis.bihis@gmail.com

References

- Bihis, D. D. L., et al. (2020). Enhancing Women’s Livelihood: Commercialization of Virgin Coconut Oil (VCO) in Quezon Province. Project Briefer.
- Bihis, D. D. L., et al. (2020). Strengthening Rural Women’s Livelihood: Commercialization of Virgin Coconut Oil (VCO) in Quezon Province. Detailed Project Proposal.
- Rocamora, J.A.L. (2019). Niyogyugan: Getting the best of Quezon in a day. Philippine News Agency. Retrieved from <https://www.pna.gov.ph/articles/1078706>
- San Juan, R. (2020). Virgin coconut oil found ‘very promising’ in COVID-19 prevention, management. Philippine Star. Retrieved from <https://www.philstar.com/lifestyle/health-and-family/2020/07/21/2029583/virgin-coconut-oil-found-very-promising-covid-19-prevention-management>



PHOTO: CGUILARAN

Aid for Batanes garlic farmers to come as DA rolls out support to quality garlic planting materials

Jhon Marvin R. Surio

To date, the province of Batanes remains as the lone province in the country with no recorded cases of coronavirus disease (COVID-19). Its local government takes pride in taking immediate actions as early as February, by closing the island to non-residents to prevent the virus from entering the province. However, since agriculture is one of the sources of economic activity in Batanes, it is also one of the hardest-hit sectors in the province.

Batanes is known to be the top producing province of garlic in the entirety of Region 2. With a total land area of 20,323 hectares, the province prioritizes the production of high value crops especially garlic, because of high market demands.

According to the region's agricultural researchers, about 98.5 hectares of the province's land is dedicated to the production of garlic, with an average yield of four metric tons per hectare. This

accounts for 394 metric tons of garlic bulbs which is about 2.34 percent of the country's total production. However, over the years, garlic production remained low in Batanes. Researchers observed that what was missing was the right planting distance that would maximize land use without compromising bulb yield.

As such, various researches were supported by the Department of Agriculture-Bureau of Agricultural

Research (BAR) over the years to produce quality planting materials and identify various cultural management practices suitable for specific locations across the country, with hopes to continually push the industry forward.

The project, “Support to Mass Production of Batanes Red and Itbayat White Garlic Quality Planting Material through Seed Production Technique in Batanes,” is one of the many projects funded by DA-BAR to increase the supply of garlic quality planting materials that are clean and free from any observable disease, through the mass propagation of conventional bulb, utilizing Batanes Red and Itbayat

White garlic varieties. Further, the project will also conduct capability building on seed production.

Technologies to be utilized also include optimal planting distance of 15-20 cm by 10-25 cm using the dibble method; mulching with rice straw, cogon, grasses, hulls with 3-5 cm thickness; organic fertilization as primary nutrient management practice; and the use of organic-based pesticide (Parker Neem).

Addressing the gaps that heavily affect garlic production, particularly on nutrient supply and spacing between hills and rows (Batanes still has vast idle lands), productivity in the province is targeted to improve.

The initiative comes on perfect timing as most Ivatans turn back to farming and even younger ones appreciate farming more. Now, parents teach their children to engage in farming and fishing activities as means of survival while the health crisis persists. This may also help the province meet export demands for organic garlic.

With the project’s implementation, production of at least 5,580 kg of Itbayat White garlic and 23,580 kg of Batanes Red garlic planting materials per year is targeted from an 8.1 ha seed production area.

Around 60 farmer-beneficiaries are targeted to undergo planting

PHOTO: RHERMOSO

materials production (10 farmers per municipality). Also, two seed production areas are set to be established, both on-station and on-farm in Itbayat, Batanes and six technology demonstration farms (one demo farm per municipality).

The techno-demo farms in the mainland (Basco, Mahatao, Uyugan, and Ivana) and Sabtang will plant Batanes Red garlic variety. This variety is preferable and suitable in the mainland and Sabtang due to bigger bulb formation. With this, identified farmer-partners in the five municipalities will plant Batanes Red garlic variety. While in Itbayat, the Itbayat White variety will be grown which is also the

preferable and suitable variety in the municipality. Accordingly, identified farmers in Itbayat will plant the Itbayat White variety.

The enhancement of capacities and awareness in plant propagation, nursery management, and production practices are also planned. Four batches of trainings, conduct of field day and cross-farm visits, and production and dissemination of about 1,000 information materials are being aimed in the long run.

The project hoped to address the lack of availability and accessibility of quality planting materials which will benefit 200 garlic farmers in the

province, especially those affected by the COVID-19 pandemic.

At present, coordination with the local government unit of Batanes and identified municipalities have been done, and selection of sites and farmer-cooperators are ongoing. The project is set to start planting in October. ■

For more information:

Charity A. Verzosa

Senior Science Research Specialist II
Research Division

Department of Agriculture-
Cagayan Valley

Tuguegarao City, Cagayan

✉ charityverzosa@gmail.com





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acd@bar.gov.ph

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DA-BUREAU OF AGRICULTURAL RESEARCH
RDMIC Bldg., Elliptical Rd. corner Visayas Ave.
Diliman, Quezon City, Philippines 1104
