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ABOUT THE COVER



In an effort to enhance farmers' income and safeguard the cultural heritage and food security in Cordillera's rice terraces, the DA-Bureau of Agricultural Research supported a research for development (R4D) project on heirloom rice, in collaboration with DA-CAR, DA-PhilRice, IRRI, and LGUs, the project introduced innovative technologies encompassing crop, nutrient, and water management, along with postharvest practices.

These advancements empower farmers to produce high-quality rice, fostering competitiveness in local and international markets, and securing a premium price for their produce.

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R4D NOTES

Mainstreaming indigenous commodities for food and nutrition

JUNEL B. SORIANO, PHD

Ensuring our population has access to healthy, sustainable food is one of the world's priorities, not only due to the impact of the COVID-19 pandemic on economies and health, but also the increasing threats of climate change and biodiversity loss.

Indigenous commodities form part of the food systems. Quite apart from cultivated or domesticated crops and animals that people commonly eat, they also offer food which is healthy and tasty. This nature's bounty has been recognized to be beneficial due to their contribution to sustainable and healthy food systems, thus underscoring its importance to food security and nutrition.

However, biodiversity across the globe is slowly disappearing. According to the Food and Agriculture Organization (FAO), approximately 75 percent of the earth's plant genetic resources are now extinct, and another third of plant biodiversity is expected to disappear by 2050.

Against this background, the DA-BAR decided to take the effort forward to support R4D initiatives that will safeguard, promote, and utilize indigenous commodities. As early as 2005, R4D efforts on conservation, propagation, and utilization of indigenous commodities such as fruits, vegetables, and native animals have been done, with DA-BAR having realized early on the value of this important resource. Taking the core of the discussion, appearing in the articles of this issue of the R4D Digest are the results of some of the R4D projects on indigenous commodities funded by DA-BAR. These projects were implemented by our partners from the DA agency and regional field offices (RFO) as well as state university and colleges (SUC).

Partnerships are key in this initiative. Our appreciation to the continuous support of our implementing partners on our endeavor to contribute to the betterment of the lives of our small farmers and fishers through R4D. Also, this collaboration will ensure upscaling of technologies and increase awareness and sharing of information among stakeholders.

Finally, we remain convinced that indigenous commodities are vital resources that offer vast potential not only for the sustainable food production systems but also for better nutrition and for adaptation to the impacts of climate change.

We hope that this issue of the R4D Digest will serve as a reference on the topic, put forward the case to increase investment in research, and help raise the interest level among stakeholders to mainstream indigenous commodities in the thrusts and priorities of the DA. ♦

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Heirloom RICE:

FROM HERITAGE TO
SUSTAINED ADVANTAGE

LEA B. CALMADA

Heirloom rice is a special kind of rice that has been planted by the indigenous peoples in the Cordillera Administrative Region (CAR). Passed down through generations, heirloom rice is normally grown in small family farms, by farmers ranging from 47 - 65 years old, who have been farming all their lives. Both men and women participate in terrace farming, with the men usually doing the tasks such as clearing the fields, fixing the terraces bonds/dikes, irrigation canals and land preparation such as plowing, harrowing, or using grab hoe and manual feet trampling, to incorporate the rice straws and weeds to the soil when carabao is not available. The women do the seed preparation, sowing, transplanting, weeding, care and maintenance of crops.

Heirloom rice landraces are known for their unique aroma, varied pigmentation (dark/light, red, dark/light purple, brown-purple), delectable taste, and high nutritional value and antioxidant content, hence, being considered as premium or specialty rice. As such, heirloom rice is currently sold at P100 to P150 per kilogram depending on the kind of landrace. It also has a high demand from health-conscious consumers.

Keeping with traditions

Mountain Province Heirloom Rice Farmers Agricultural Cooperative (MPHRFAC) is a province-wide organization with 134 members. Jovita Camso, a farmer from Tadian, Mountain Province and currently the treasurer and technical adviser of MPHRFAC

recalled that since childhood her parents and the whole community were planting many kinds of heirloom rice landraces in the terraces. Then came the late 1990s, lowland high yielding varieties with shorter maturity periods were introduced by the government to raise the productivity of farmers, especially those involved in rice production.

“We were given farm inputs such as high yielding varieties of rice seeds and many other agriculture services. Many farmers eventually embraced these rice varieties that are adapted in our rice terraces condition thus causing the extinction of many traditional rice landraces,” Camso cited.

A study conducted by the DA-CAR, Philippine Rice Research

Institute, and International Rice Research Institute highlighted the issues confronting rice farmers in the Cordillera. Among them is the production of traditional rice varieties for home consumption only and the low level of mechanization for soil preparation, milling, reaping and threshing. It also noted the lack of access to a formal seed system; substantial knowledge of markets; skills in producing, processing, storing and marketing quality rice seed, grains, and other crop products; and entrepreneurial skills. Problems in the value chain and production constraints starting from cultivation until it reaches the final consumer were also discussed.

Springing growth with R4D

With the aim of increasing the farmers' income and sustaining the heritage and food security in the rice terraces of the farming communities in the Cordillera, the DA-Bureau of Agricultural Research funded a research for development project on heirloom rice. Focused on raising productivity and enriching the legacy of the commodity, DA-CAR's research worked with communities in rice-based ecosystems in Cordillera from February 2014 to December 2016.

Banking on the gains of the initial project, DA-CAR implemented another BAR-supported project in 2017 to 2022. The research project was collaboratively implemented by the DA-CAR, PhilRice, and IRRI in partnership with the local government units.

Speaking as regards market, Camso shared that the coming in of the foreign market in 2007 reignited farmers' interest in heirloom rice. As they can buy selected or preferred traditional/heirloom rice landraces at double price as compared to the

prevailing price of commercial rice in the local market, farmers were encouraged to produce those landraces and sell to the export market. This meant an increase in their productivity and income.

With the help of this export market and in coordination with regional government agencies, farmers who were interested to supply in the export market were trained on natural farming system and quality control. They were also given production and postharvest equipment to help them attain the quality standards of the market.

Camso claimed that the technologies developed and introduced through the project helped enhance the indigenous rice farming practices handed down by their ancestors. The technologies introduced included crop, nutrient, and water management, and postharvest. Partner farmers were also trained to produce natural fertilizers using raw materials available in the locality. This is to maintain the ecological balance and biodiversity of the farming community.

"We planted heirloom rice in the terraces from our own kept seeds. We never used any chemical inputs on our farms but utilized only the weeds, sunflowers, rice straws, rice hulls, and other crop residues as basal fertilizers," Camso cited.

Reaping more than usual gains

The technology delivered benefits at individual, familial, and community levels.

According to Camso, the technology intervention allowed farmers to produce a quality rice product that is competitive with local and foreign markets and demands a higher price. Products

of the cooperative members that pass the quality standards are paid P10.00 higher per kilo over the products that fall short of the quality. This resulted in an increased yield of at least 30% and income.

"There was a farmer who was able to buy a carabao. [Another] said she was able to purchase G.I roof materials for their house construction. It's heartwarming to hear from an heirloom rice farmer's son that he and his younger siblings were able to finish a college degree. [The] sales of their father's heirloom rice products [which] he supplied in the cooperative financed their tuition fees and they are now both employed in the government and private sector," Camso shared.

The cooperative plays a key role in the adoption and sustenance of the heirloom rice. It helps members manage their crops and money efficiently. While, the government helps through the provision production and postharvest support services needed as well as linking the cooperative to sustainable markets.

To address sustainability of the technologies, the DA-CAR has established a partnership with other national agencies and institutions towards the development of the Heirloom Rice Development Program in the region. ♦

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Native Corn

R4D: HARNESSING THE BEST QUALITIES FOR BETTER VARIETIES

ALEXIS B. DEL MAR

Brought by the Spanish colonizers from Mexico through the Manila-Acapulco galleon trade, the origin and safeguarding of Philippines' native corn has some interesting tales to tell.

Across successive generations, Filipino farmers have continued to cultivate these native corn strains, prized for their genetic resilience against various plant diseases and environmental stresses. Additionally, their exceptional taste owes much to the dedicated care and cultivation by these farmers.

To conserve and utilize

To conserve these native corn varieties, the Institute of Plant Breeding of the University of the Philippines Los Baños, in collaboration with the Department of Agriculture-Bureau of Plant and Industry and DA-Regional Field Offices (RFO), has implemented the Corn Germplasm Utilization through Advance Research and Development (CGUARD) program.

It was funded by the DA-Bureau of Agricultural Research under the department's National Corn Program.

"The concept of CGUARD is deeply rooted in environments characterized by unusual conditions, such as regions susceptible to both drought and floods, as well as fields where corn is continuously cultivated, subject to the presence of corn pests and diseases," shared CGUARD technical expert, Dr. Artemio Salazar.

Salazar emphasized the adaptability of corn, it being cross-pollinated, enables it to thrive in diverse environmental challenges. Following planting, the most firm and enduring corn varieties will prevail and be chosen by farmers as their preferred selection. These favored varieties may possess resilience against the Asian corn borer (ACB), resistance to Fusarium ear rot (FER), protection against downy mildew

(DM), and the capacity to endure both drought and waterlogging.

In addition to preserving these varieties with valuable genetic variability, the program aims to enhance these varieties for higher yields using straightforward plant breeding techniques.

"Beyond their resistance to stress and diseases, we have selectively bred these varieties to increase their yield," Salazar remarked.

The CGUARD domain

"In this program, being the first of its kind, we have taught other regions how to breed native corn," shared Salazar.

He noted that relying solely on the IPB to breed all the native corn varieties for the entire nation is not feasible. They have proposed the concept of regional collections to ensure a more diverse genetic pool. He argued that having each region collect and breed its own varieties is essential for maintaining genetic

variability, which, in turn, would lead to sustainability.

To date, the CGUARD program has successfully conserved, characterized, and utilized 4,373 different corn varieties. These varieties are currently safeguarded and stored by different DA-RFO and the National Plant Genetic Resources Laboratory of IPB for future use.

The IPB has published three volumes of catalog that contains the description of the germplasm collected by all regions. It also features different corn recipes.

Corn as staple food

Corn holds a significant position as a key crop in the nation, trailing behind rice only in terms of its agricultural resource utilization. Its applications extend beyond human consumption as it also serves as a vital component in animal feed and various industrial processes.

Sylvia Bauí, a 64-year-old corn grower hailing from Sta. Maria, Isabela has been cultivating native corn varieties since her childhood, primarily for personal consumption.

“We plant native corn in our half-hectare land for consumption... they are very delicious, we can even harvest even if there is drought,” Bauí claimed.

“One of the remarkable aspects of our native corn varieties, which our farmers frequently return to, is their exceptional eating quality. They are truly delicious, especially our white corn, making them a favorite among our corn-consuming farmers,” shared Roynic Aquino of DA-Cagayan Valley Research Center.

The future of corn farmers

“It does not mean that these newly developed varieties will replace the traditional native corn varieties currently cultivated. CGUARD’s aim is simply to provide farmers with an alternative, allowing them to continue growing their familiar native varieties with enhanced characteristics,” underscored Aquino.

Salazar also remarked that the fate of CGUARD remains unknown, contingent upon the actions of our nation, the backing of our government, and potentially, even the involvement of the private sector.

As of writing, the BPI-National Seed Industry Council has approved the registration of two CGUARD varieties: CVRC Glut 21-16, commonly referred to as Deko (glutinous) of DA-Cagayan Valley Region, and Tupi 1 WIT, also known as South Cotobato Improved Tiniguib of DA-Soccksargen.

CVRC Glut 21-16 boasts an average grain yield of 5.99 mt/ha in Luzon and 4.35 mt/ha in Mindanao. It also features a robust husk cover, providing resistance to many pests and diseases. Meanwhile, Tupi 1 WIT showcases an average grain yield of 5.15 mt/ha, surpassing another check variety from Mindanao that achieves approximately 4.98 mt/ha. Additionally, it exhibits a shelling recovery rate of 79%, 22-24 kernel rows, and apparent tolerance to downy mildew disease. ♦

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TRAILING ADLAY R4D THROUGH THE YEARS

RENA S. HERMOSO

Over the past decade since the Department of Agriculture (DA) rolled initiatives to develop, promote, and utilize adlay, it has been positioned as a healthy alternative staple food. This indigenous crop, usually grown by the indigenous peoples in Mindanao, slowly gained popularity among health conscious individuals owing to its gluten-free, low glycemic index, and protein richness.

The DA-Bureau of Agricultural Research (BAR) funded various research projects to explore and intensify the production of adlay. These research showed adlay performs best in high elevation areas, but it can also thrive in low elevation areas particularly during wet season. It can be planted as a main crop, hedgerow, and intercrop with fruit trees and plantation crops.

Adaptability yield trials were conducted in strategic locations nationwide, specifically Ilagan, Isabela; Lipa City, Batangas; Pili, Camarines Sur; Midsalip, Zamboanga del Sur; and Malaybalay, Bukidnon. The top three high yielding varieties across the regions were Gulian, Ginampay, and Tapol.

Ensuring adlay supply during the pandemic

Call for the steady supply of food was amplified during the onset of the pandemic three years ago. DA, through the Bayanihan to Recover as One Act, exhausted its efforts to ensure that the call was heeded.

In this light, the DA-BAR funded the project, Development of Sustainable Adlay Enterprise for Farmers in Marginal Areas, implemented in Zamboanga Peninsula, Northern Mindanao, and Davao Region.

These projects augmented the supply of adlay; made quality seeds available and accessible; produced quality, safe, and affordable grits and other adlay food products; strengthened market linkages with potential buyers; upscaled, outscaled, and sustained adlay enterprise efforts by encouraging local governments to take over the adlay enterprise; and strengthened partnerships, skills, and knowledge of IP communities and adlay producers' groups.

As of December 2019, the total harvest from the eight regions (namely, Cagayan Valley, CALABARZON, MIMAROPA,

Zamboanga Peninsula, Northern Mindanao, Davao Region, SOCCSKSARGEN, and Caraga) was 92,559 kg. Among the package of technologies developed were the planting distance of 90 cm x 60 cm, seeding rate of two seeds per hectare, and fertilization rate at 240-120-120.

Developing adlay lines and varieties

The DA-Philippine Rice Research Institute (PhilRice) recognized, initiated, and led the collection, conservation, and establishment of the genetic profile of adlay cultivars in the country to support genetic improvement. In 2021, through funding support from DA-BAR, DA-PhilRice collected and conserved 80 adlay germplasms at their genebank. Of this, 22 were agro-morphologically characterized using the modified adlay UPOV descriptors in the 2022 dry season.

The Phase 1 of the project showed that the adlay germplasm collection had moderate degree of phenotypic variation and diversity.

Now on its second phase, DA-PhilRice continued the profiling and characterization (pre-harvest and postharvest) of the previous

and new adlay collections.

Thirty-three adlay collections were characterized in the 2023 dry season, which exhibited interesting variation of characteristics. Wide variation of plant height traits from 136.4 cm (NMACLRC selection ADL007) to 203 cm in Ginampay-B (ADL0059-B) under Maligaya, Nueva Ecija condition. Meanwhile, five adlay germplasms showed early maturity, less than 140 days, under the aforementioned condition.

Further, Kili-kili (ADL006) had the darkest hull while Ginampay-A (ADL0059-A) had the lightest hull. Majority of the collection exhibited spherical grain shapes, while milling recovery of adlay germplasm collections ranged from 23.39% to 44.70%. Four adlay germplasm (Kibuwa, Nomnom, Gulian, and Tapol) collections were selected for parents for genetic improvement through mutation approach. The 56 selected Kibuwa and Nomnom adlay mutants showed a wide genetic variation in plant height to its wild type counterpart

Kibuwa and Nomnom.

The characterization and breeding selection of adlay with high yield and improved traits such as early maturity, grain quality characteristics, as well as establishing nutritional values and nutrition facts of selected and preferred and high market potential adlay varieties are ongoing. Varietal seed purification and seed increase of previous and new adlay germplasm collections are also ongoing. ♦

“...research showed adlay performs best in high elevation areas, but it can also thrive in low elevation areas particularly during wet season. It can be planted as a main crop, hedgerow, and intercrop with fruit trees and plantation crops.”

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Sweeter days ahead with *Visayan Souring Agent*

MA. ELOISA H. AQUINO

Established agripreneurs based in Bacolod City, Negros Occidental, Gina and her husband Francis Salviejo ventured into batuan processing when they discovered the technology during the Panaad Festival in 2018. After attending a training organized by DA-Western Visayas in the same year, they adopted the technology that paved the way to include batuan products under the trademark Mumshie.

“Very promising and at par with sampaloc...We look forward to also make Negros known as Batuan capital,” Gina remarked.

Introducing batuan

Widely grown and distributed in Luzon and Visayas, batuan or *Garcinia binucao* is a native tree commonly used as a souring ingredient in Ilonggo and Negrense dishes—an alternative to sampaloc and balimbing.

However, this promising fruit is often neglected though can be considered profitable as it does not require much input. This prompted the DA-Bureau of Agricultural Research and DA-Western Visayas to explore its commercial value as food and source of additional income.

“Batuan is a seasonal fruit and often ignored since it is only utilized in Western Visayas.

Harvest time is August to December and January to May. Market price [is at least] Php 13.25 per kilogram when in season and at most Php 300.00 per kilogram during off-season. Based on the data, fruit production ranges from 99,792 kg to 626,472 kg per season,” Nora T. Garpa, project leader explained.

In collaboration with different regional government agencies, DA-Western Visayas introduced and promoted batuan through attendance to exhibitions, expositions, and trade fairs. The research team also attended series of trainings on batuan processing, financial viability and profitability analysis of agricultural technologies and enterprises, food handling and food safety seminar, food additives, and product labeling.

Propagation and upscaling of batuan

Initially, Iloilo Research Outreach Station (ROS) established Batuan Nursery and Scion Grove as the source of planting materials. The station then determined the best propagation techniques to hasten germination, since batuan seeds germinate at about 10 to 12 months. Through said technique, more root stock were made available for grafting batuan and distribution to batuan farmers through other DA-ROS.

The Research Organic Facility of the DA-Western Visayas upscaled products developed by the University of the Philippines-Los Banos. Modifications on the development process and the formula were made to suit the flavors of Western Visayas. This led to the development of new batuan products such as powder, sinigang mix, jam, jelly, pickles, halves, pastillas, and piaya. Moreover, batuan propagation and processing technologies

were introduced to farmers, processors, and representatives from the local government unit for promotion and adoption.

“The project was able to assist technology adaptors through hands-on trainings, technical assistance in the setup of their facility, designs of equipment and initial monitoring for in-house regulation of products,” Garpa noted.

The batuan owners turned suppliers in their locality was an offshoot of the processing. Among the start-up adapters are BIMPT Food Product of Igaras, Iloilo; VG Power Products and Amjoe Food Product, both of Miagao, Iloilo; Lyzette Food Products of Iloilo City; Brendan’s Bakeshop of Oton, Iloilo; and MFK Agri Product & Technology which holds the brand name, Mumshie.

Benefitting one after another

The Salviejo couple became the most successful batuan technology adopters in Western Visayas. Gaining interest during the festival, Francis attended the second batch of training at the Department of Agriculture Organic Processing Facility. From mushroom processing, the couple started conducting pilot testing on the developed batuan products.

DA-Western Visayas provided mentoring and actual processing demonstration, making them the top endorser of the products and technology, plus the fabricator of the processing equipment.

Since 2018, they have already been producing and distributing batuan product lines. Processing includes depulping or brining to produce powder, sinigang mix, jam, jelly, pickle, puree, and flakes. In a week, 500 kilograms of fresh batuan fruits are delivered

for processing.

“*Malaking tulong sa* farmers and environment because the fresh batuan, the raw materials, are being sourced directly from farmers from Negros Occidental, some from Iloilo, Antique, Masbate, and Bohol.” Gina said.

She added that farmers can have additional income during batuan off season given the increased demand and buying price. From Php 30-50 per *gantang* during season, it becomes Php 100-300. With the support from provincial government of Negros Occidental, farmers started planting more batuan from grafted seedlings both for reforestation and as source of raw materials.

The processing activities also created job opportunities. As the income of the Salviejo household increased, they expanded and invested more on new machines to further increase the volume.

“The technology is very profitable and sustainable. With the standard processing protocol, there have been improvements in production efficiency, hence, increase in production volume by using food grade depulping machine and electric dryer,” she declared.

Batuan products are being distributed to partner outlets and online shops. Through partner promoters or independent buyers, batuan products can be seen in local trade fairs and have reached the United States, Canada, Australia, Middle East, and Europe. ♦

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“Widely grown and distributed in Luzon and Visayas, batuan or garcinia binucao is a native tree commonly used as a souring ingredient in Ilonggo and Negrense dishes—an alternative to sampaloc and balimbing.”



Kalumpit:

Philippine cherries on the rise

LARA ABEGAIL S. ESPIRITU

An oval fruit with a smooth peel that turns dark red when ripe, an underrated, unassuming fruit called kalumpit nestled in the humble town of Tagkawayan, Quezon is on the verge of becoming not only a cultural icon, but a culinary piece in its own right.

In a project, Production, Utilization, and Conservation of Kalumpit (*Terminalia microcarpa*), supported by the DA-Bureau of Agricultural Research (DA-BAR), the Southern Luzon State University–Judge Guillermo Eleazar (SLSU-JGE) Campus in Tagkawayan, Quezon explored the many potentials of kalumpit, utilizing its unique and delightful symphony of flavors, so far turning it to jams, jellies, and wines.

Not your usual jam and jelly

Based on the research conducted by the SLSU project team, one of the most popular ways to enjoy kalumpit is by making it into a sweet and tangy jam and jelly. The fruit's naturally tart flavor makes it perfect for preserves and spreads. Most often enjoyed with bread or used as a filling for local pastries, kalumpit jam and jelly adds a unique twist to traditional Filipino sweets.

To cater to the Filipino taste, the

research team conducted several sensory and taste evaluations to diverse consumers.

“We know that Filipinos love that balance: not too sweet, not too pungent. And so we want to make sure that our products will achieve that flavor, while preserving the distinct kalumpit taste,” said project leader Dr. Rebecca O. Rufo.

But what made kalumpit jams and jellies truly a local delight is its authentic flavor profile—veering away from the usual fruit jams and jellies available in commercial markets. In addition, it has cultural connection being an indigenous fruit in the Philippines, creating a sense of pride especially to the locals of Tagkawayan.

Kalumpit wine: proudly local

In addition to the spread, Dr. Cherry C. Favor, a component leader of the project, crafted a wine recipe which equally appeals to Filipino palates, capturing the perfect balance of flavor, color, and aroma; thus winning the hearts of local wine enthusiasts.

According to Dr. Favor, crafting kalumpit wine is a skill that combines traditional and modern know-hows. “We harnessed

different technologies and learned from wine experts to come up with a unique beverage we can proudly call our very own,” she emphasized.

Market and sustainability

As in any research undertaking, market viability must be paramount for its pursuit. The project, which was completed in 2018, was, according to Dr. Rufo, driven by the prospect of creating value while addressing needs and meeting consumer demands locally.

“Exploring kalumpit was a gamble, because it was not as popular as other fruits, but we are sure that it has resonated with our consumers, with our kababayans, generating interest and later on acceptance as another local product,” Dr. Rufo shared. “It was indeed a Proud Pinoy product, so to speak,” she added.

To date, these array of products found place in local stores within the province and has taken stage in various national fora showcasing agricultural products and innovations.

While kalumpit presents social, cultural, and economic benefits, it is not exempt from challenges similar to other indigenous crops.



With only about less than 500 kalumpit trees planted across agricultural zones in Tagkawayan, Quezon, its limited production must be addressed head-on.

With its many uses and a growing demand, the project team envisions working on improving the supply to secure a stable source for kalumpit-based products. Aside from the fruit, the trunk of the tree is being used as lumber for building houses as it grows as high as 35 meters and 15 meters wide.

That is why a study to determine the best soil media for seedling

production was carried out throughout the project duration to ensure conservation and sustainability of planting kalumpit. Advocacy campaigns were launched to increase the population of kalumpit trees in communities to safeguard a sustainable supply for the coming years.

To the Tagkawayanons, kalumpit is more than just a tree, it's their cultural quintessence. The development of kalumpit products through this project showed a unique approach to exploring its potential. As local communities strive to protect

the kalumpit tree, they remain committed to maintain and preserve kalumpit as their source of ideas and pride.

“We want our kalumpit products to gain recognition not only locally, but also on the international stage,” Dr. Rufo declared. ♦

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Massive Opportunities with RIMAS

MA. ELOISA H. AQUINO

Rimas (*Artocarpus altilis*) or breadfruit or Kolo is among the trees growing abundantly in the Bicol region with an expansive 1,200 hectares. With its fruits serving as source of energy and essential nutrients to the local populace, this fruit tree is grown more as a backyard tree rather than a plantation-type crop grown intensively and productively in farms.

Accessible yet often ignored, DA-Bicol Region looked into this indigenous crop. They conducted benchmarking and biodiversity studies geared towards the conservation of the region's breadfruit germplasm and mass propagation of seedlings. These were conducted in the provinces of Albay, Sorsogon, Camarines Sur and Catanduanes.

"DA-Bicol Integrated Agricultural Research Center (BIARC) conducted different studies and promotional activities in order for the commodity to attract attention," shared regional technical director Luz Marcelino.

Also, researches on pest management, propagation techniques, and nursery establishment were undertaken.

"Nursery establishment in the provinces of Masbate and Albay were conducted to provide planting materials across

different provinces," Marcelino added.

"Because rimas fruit is seedless, one of the challenges was the insufficient number of rimas for distribution. With this gap, the project came up with an experiment that will help in rimas propagation," Henrilyn Yamson, DA-Bicol Region science research specialist cited.

Propagation techniques were explored by the research team. These include tissue culture, grafting, and marcotting.

As reported, the project was able to "maintain 320 plants inside the laboratory and 25 potted plants (under observation) from tissue culture technique in the station and 200 grafted rimas in Albay Experiment Station. In grafting technique, higher rate of survival was obtained in using Gumihan (*Artocarpus sericicarpus*) as rootstock—with 52%, compared to Kamansi (*Artocarpus camansi*) with 20%. Marcotting technique showed that 89% from 50 replicates displayed roots after 33-35 days. Also, the project was able to maintain one scion grove consisting of 22 trees for almost a year." Best practices on grafting using gumihan as rootstock was cascaded.

DA-Bicol Region pursued transfer of technology through provision of technical training for rimas

production and marketing, which further capacitated organizations.

Further, aimed to promote its economic importance, five recipes were developed for pastry and desserts by Arlene de Asis and DA-BIARC Food Laboratory. These include ice cream, doughnut, roll, chips, and pastillas. Rimas flour was also developed. Conducted acceptability tests found that rimas flour was comparable with other flours in the same category like cassava and camote.

Through strong partnership and collaboration with the local government units, rimas products were introduced in Siruma, Naga, Camarines Sur and in Legazpi City, Albay. IEC materials were also developed and promotional activities can also be accessed through its facebook page—Bicol Emerging Commodity.

Members of Rural Improvement Club, Triangulo, Naga City Chapter involved in production of tropical wines, flours, and cosmetics, incorporated production of rimas ice cream in their activities. The project assisted the group with the start-up activity including the renovation of the facility at Triangulo, Naga City, which is now called House of Rimas. Basic processing equipment were also provided including ice



“ ... aimed to promote its economic importance, five recipes were developed for pastry and desserts ... include ice cream, doughnut, roll, chips, and pastillas. Rimas flour is also developed. ...rimas flour was comparable with other flours in the same category like cassava and camote. ”

cream maker, osterizer, freezer, depulper, dehydrator, vacuum sealer, and packaging materials.

“The RIC was able to provide economic value to rimas thus providing an opportunity to rimas planters, employment to its members, and healthy options to our consumers,” Marcelino highlighted.

Also with its high potential, distinct flavor, and high acceptance, Yulaik Food Company also adopted the technology and further commercialized the product.

“Aside from preparing it as boiled or ginataang gulay, rimas now offers value added products providing additional income in

the household, thus empowering the role of women in processing,” Marcelino ended. ♦

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REVIVING *Sea Cucumber* FISHERIES

MARIA ELENA M. GARCES

A pantropic crisis—this is how the overfishing of sea cucumbers and lost livelihoods of artisanal fishers in the tropical regions are described.

A high value species, sea cucumber is easily harvested from coastal or inshore habitats and its stocks have been heavily depleted due to unregulated fishing activities and habitat destruction. Thus, a need to prioritize better fisheries management.

Through the introduced aquaculture and stocking technologies, communities can be motivated into conserving wild breeding stocks while generating income and speeding stock recovery.

Successful hatchery and ocean nursery production of juveniles have been used to restock depleted areas. Growing sea cucumbers on sea beds, referred to as “sea ranching,” has been demonstrated to be effective in establishing viable spawning populations and providing a supplemental source of income to small fishers.

Further, breeding populations can be maintained in sea ranch areas and reserves to rejuvenate larval supply to nearby fishing grounds. Regulation of size limits for collection (> 320 g) is essential to increase fishers’ production of premium grade-size sea cucumbers.

Recently, culture systems to diversify sea cucumber production systems that do not negatively impact the environment, while increasing income streams in the municipal fishery sector, was piloted in three barangays around the municipality of Bolinao, Pangasinan. This research for development (R4D) project is being undertaken by Dr. Marie Antonette Juinio-Meñez of the Marine Environment and Resources Foundation, Inc. (MERF) at the University of the Philippines Diliman-Marine Science Institute (UPMSI).

Raising sea cucumber performance

Sea cucumber was cultured with sea urchins, rabbitfish, and mussels. These species belong to complementary low trophic

level feeding groups (i.e. deposit feeders, grazers, filter feeders) that can recycle nutrients in the water column and the sediment. The selection of sites for the co-culture and multitrophic culture systems took into consideration the environmental factors including type of habitat suitable for the species as well as the availability of prospective community partners who could be engaged in the area.

To validate the performance of the systems introduced, pilot trials of the five culture systems: (a) existing culture system of sea cucumber; (b) co-culture of sea cucumber and caged sea urchin; (c) co-culture of sea cucumber with free ranging sea urchin; (d) co-culture of sea cucumber, free ranging sea urchin, with addition of rabbitfish; and (e) culture of sea cucumber with mussels and rabbitfish, were conducted.

Results indicated that sea cucumber can be co-cultured with sea urchins and rabbitfish. Sea cucumber cultured with free-ranged sea urchins and rabbitfish, have higher growth rates than with caged sea urchins.



The removal of the sea urchin cages will eventually reduce the material cost when scaling this culture system. The integration of sea urchins and rabbitfish as secondary species in the rearing of sea cucumber can increase the sources of food and livelihood of small-scale fishers in Bolinao, Pangasinan.

Since washed out *Sargassum* debris is added as feed for the sea urchins in the field, laboratory experiments were conducted at the Bolinao Marine Laboratory of the UPMSI to determine if the feces of sea urchins fed with *Sargassum* improves the growth of sea cucumber juveniles. Results showed that sea cucumber preferred *Sargassum* sp., enriched sediment areas and the best growth performance was observed in the sediment enriched with sea urchin's feces.

Bettering incomes and natural stocks

The innovation on the integrated culture systems with sea cucumber has the potential to produce larger sizes of sea cucumber and could create additional source of income to

small fisher households.

Dr. Juinio-Meñez reiterated that the development of new technologies as well as improvement of existing ones would improve aquaculture production and reduce dependence on wild-caught sea cucumbers, thus contributing to conservation efforts. Integrative culture system approach in sea cucumber production could address the concerns in supply and value chain in the sea cucumber industry in the country.

The small-scale environment-friendly culture production systems will specially benefit the small fishers and households with the supplemental source of income from the culture system and at the same time help rebuild depleted natural stocks. According to studies, sustainable culture systems, such as those being piloted, can help accelerate recovery of depleted sea cucumber populations. However, the best way to increase production of premium-grade sea cucumbers is still to manage the natural stocks of all sea cucumber species.

Further, public-private partnership is essential to speed up commercial hatchery production together with grow-out production systems that engage commercial and local fishers with the support of the local government.

Dr. Juinio-Meñez underscores that the “implementation of a fishery administrative order by the Bureau of Fisheries and Aquatic Resources, setting the size limit of 320 grams of sea cucumber for harvesting and processing, coupled with standards for trepan (dried sea cucumber) set by the Bureau of Agriculture and Fisheries Standards, will be essential to help improve the production of premium grade-size sea cucumbers to [at least] decrease further depletion of the natural stocks.” ♦

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The sea urchins are spiny globular invertebrates found in marine environments across the globe. Closely related to the sea stars (starfishes) and sea cucumbers, these echinoderms are among the conspicuous members of most benthic marine habitats. Their ability to alter algal community states make them keystone species in their specific localities.

Sea urchins are among the major fisheries resources in the world which are commercially exploited because of the high demand for their gonads or roe, which are marketed internationally as uni. In the Philippines, the most exploited species is *Tripneustes gratilla*, locally known as maritangtang or kuden-kuden.

Decline in the sea urchin production was reported in the reef flats of Bolinao, Pangasinan and other parts of Northwestern Luzon such as the coastal waters of Ilocos Norte and Ilocos Sur. Lower harvest rates and exploitation of the area indicate overfishing of the resource due to the high international demand for brined sea urchin gonads.

The uncontrolled and nonselective harvesting of sea urchin, extensive gathering [or

gleaning] sea urchins in the wild as a major source of livelihood in many coastal villages, increased market demand, and high market prices, all resulted in the depletion of wild stocks.

Managing the wild

Mitigating measures were adopted to slow down depletion of this commodity in the wild and revive the status of sea urchin industry. One such measure was the implementation of an annual closed collecting season from December to January, which proved to be effective. Unfortunately, the closed season was enforced for only two years and catch continued to decline until sea urchin fisheries collapsed from lack of effective enforcement. Further, violations hardly resulted in significant punishments.

Another mitigating measure was the restriction on harvestable size at first reproduction which is not less than six centimeters. Marine reserves, where natural sea urchin populations may reproduce to replace depleting fishing grounds, were also designated.

Managing culture practices

Stock enhancement and sea ranching are management

strategies adopted to improve productivity of sea urchin in the wild. In a study conducted, juvenile sea urchins were distributed in submerged plastic cages in the reef areas, fed with seaweed (*Sargassum sp.*), and allowed to grow to adult size. The adult sea urchins were maintained as spawners allowing them to naturally reproduce and populate the areas.

After two years of the study, results showed an increase in sea urchin population in the area. Fisherfolk in the nearby coastal towns also observed a remarkable increase in the population of sea urchins. With this, they also started putting up cages in the area, collecting juveniles, and growing them to marketable sizes, thereby proving that sea urchin culture is a good alternative livelihood.

Studies on hatchery production and grow-out pens were conducted focusing on the recovery of the sea urchin industry. Sea urchin grow-out culture in pens was piloted in the Ilocos region which showed promising results. Emergence of innovations on sea urchin grow-out technology became evident and were verified in potential

POPULATING Sea Urchin STOCKS

MARIA ELENA M. GARCES

areas on ideal water parameters and environmental conditions.

The development of sea urchin grow-out culture in cages is another scheme which also addresses the need for resource sustainability and economic recovery. The coastal villages have succeeded in culturing sea urchins in cages and later growing them in an open seabed in a method called “sea ranching.”

Days of culture depend on the size of sea urchin juveniles stocked in cages. Mongo seed-sized juveniles can be harvested in 6-8 months, while medium-sized juveniles can be harvested in 3-4 months of culture period, making sea urchin culture a year round activity.

Earning more while preserving nature

“This again opens an opportunity to expand and further develop the aquaculture industry for fisherfolk to earn additional livelihood through a series of trainings on sea urchin culture, such as construction of cages and proper management, handling, and harvesting gravid adult sea urchins,” underscored Antonietta D. Evangelista, officer-in-charge of the Regional Marine Technology

and Development Center, Bureau of Fisheries and Aquatic Resources, Ilocos Region.

She added that the coastal waters have abundant macroalgae (i.e. seaweeds like *Sargassum sp.*) and seagrasses that sea urchins eat. Hence, no commercial feed is introduced to the marine environment making the echinoculture industry ecologically friendly.

Sea urchin culture has helped a lot of fisherfolk by increasing their income, solving unemployment, and providing a good alternative livelihood to fishing. It also has helped minimize illegal methods of fishing in the area, maintain the cleanliness of the sea, and increase tourism.

Reviving the sea urchin population proved that a low cost technology of maintaining spawners in cages in natural grounds is more practical than putting up a land-based hatchery which costs more in construction and maintenance.

“Recognizing the efforts of BFAR Region 1 programs on resource management, this venture augments the efforts in

the recovery of natural stocks of economically important invertebrates (i.e. sea urchins and sea cucumber) in Ilocos Region, such as establishment of fish sanctuaries, reseeding and other interventions,” concluded Evangelista. ♦

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DEVELOPING CHICKEN *Breeder Farms* FOR SUSTAINABLE MEAT, EGG PRODUCTION

ANGELO N. PADURA

Native chicken is beloved by lots of Filipinos for its unique flavor and taste, and leaner, more textured meat—making traditional dishes, such as tinola and inasal, even more delectable. With this, it has been a steady source of livelihood to many small backyard farms in many rural communities in the country.

Despite the country producing 200.21 million heads of chicken in 2021, with half being native chicken, its full potential remains largely untapped due to limited technologies in breeding, production, and marketing.

In collaboration with the DA-Bureau of Agricultural Research (BAR) and the DA-Bureau of Animal Industry (BAI), the National Swine and Poultry Research Development Center (NSPRDC) initiated the Development of Breeder Farms for Philippine Native Chicken (Paraoakan, Banaba, and Joloano) for Meat and for Egg project which aimed to establish breeder farms for sustainable

production and efficient distribution of high-quality breeder stocks.

“The project strives not only to meet current demand but also to overcome technological barriers hindering the broader utilization of native chicken, promoting a more sustainable industry,” Rene C. Santiago, DA-BAI-NSPRDC project leader said.

The study utilized Paraoakan, Banaba, and Joloano breeds of Philippine native chicken as foundational Grand Parental (GP) stock. To sustain the production of pure and parental lines of these breeds of native chicken, the researchers promoted the adoption of a pyramid breeding structure and distribution scheme which constitutes the nucleus, multiplier, and commercial native chicken farms.

To address challenges in breeding, production, and distribution, multiplier breeder farms both for commercial and backyard production were

established through the project.

“The nucleus farm, the Center, distributes pure Parental Stock (PS) to multiplier breeder farms, operating on a medium-to-large scale to meet demands from both commercial enterprises and backyard production,” Santiago explained.

By selecting breeding pairs, controlling mating, and monitoring genetic diversity, careful breeding management significantly improved the meat and egg production. Additionally, proper feeding management ensured essential nutrition for overall health, growth, and reproductive capabilities of native chickens.

The performance evaluation of nucleus and multiplier farms showed Paraoakan and Joloano are ideal for meat production due to their larger body composition, while Banaba, with its smaller size and lower feed consumption, excels in egg production.

“ By selecting breeding pairs, controlling mating, and monitoring genetic diversity, careful breeding management significantly improved the meat and egg production. ”



Meanwhile, the cost and return analysis conducted in the study revealed a rate of return to capital of 187.39% for nucleus farms and 302.75% for multiplier farms.

“The project presents opportunities for expansion on a larger scale, considering its initial focus on the CALABARZON region

and the utilization of only three breeds of native chicken. A logical next step could involve extending the project to encompass broader geographical areas and exploring additional native chicken breeds. Additionally, there is potential for further research into alternative feeds for native chickens, especially given the ongoing

increase in the cost of commercial feeds,” Santiago said. ♦

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Native Pigs SCORE BIG GAINS

ANGELO N. PADURA

Dark as it appears yet its full potential is as bright as the broad daylight.

Native pigs have filled most of the backyard pens and grassy spaces in many rural farming communities in Batangas and Quezon over the years. Its ability to grow and reproduce well under natural environment, innate resilience to various environmental stresses, and low capital requirement make it the top choice for most pig raisers.

The Philippines is home to several strains of native pigs such as the Quezon (Q)-black, Benguet, Sinirangan, ISUbela, Yookah, Markaduke, Biskaya, Abra, and BAI Tiaong (BT)-black. In 2017, an estimated population of 93,029 native pigs was produced in CALABARZON alone.

Good old traits

The beauty of native pigs is more than skin deep. In fact, experts from the DA-Animal Breeding and Genomic Section explained that Philippine native pigs have more favorable genetic material for marbling or the intermingling of fat with lean muscle, making traditional dishes like lechon more delectable.

“Maganda ang himaymay ng laman ng native pig. Karamihan ng mga bahay dito sa amin ay may alagang native na baboy

kasi parang alkansya namin ‘yan eh. Marami ang umaakyat dito sa aming barangay [San Agustin] para bumili ng native pig na litson,” Manuel Odi, former barangay captain and native pig farmer in Gumaca, Quezon, cited.

Aside from their distinct black color, the Philippine native pigs breed and give birth easily. The native sow can farrow five to eight piglets resulting in a fast-growing population of these pigs over time. In addition, by feeding on local feed materials and forages such as banana, *Trichantera gigantea* (commonly known as madre de agua), malunggay, among others, native pig sow and boar can grow up to an average body weight of 40 to 60 kg.

“Halos wala kaming ginastos sa pakain dahil ‘yong mga halaman at puno lamang na mayroon sa aming bakuran ang ipinapakain namin. Dahil dito, mas malaki ang kinikita namin,” Jennifer Argel, a two-year native pig farmer in San Agustin, Gumaca, Quezon, shared.

Something new to venture into

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

With funding support from the DA-Bureau of Agricultural Research, DA-CALABARZON commercialized the technology in processing meat products utilizing native pigs in 2020. It aimed to expand the livelihood of native pig farmers by intensifying native pig production; capacitating farmers with the meat processing technology; upgrading processing facilities for larger production; improving shelf-life of the meat products, and establishing market linkages.

“Base sa presyo na ibinigay ng provincial veterinarian office, ang mga culled sow at oversized pig na may edad na tatlong taon pataas na karaniwang tumitimbang ng 60 kg pataas ay nagkakahalaga lamang ng PhP 65 – PhP 100 kada kilo. Kapag ito ay processed, aabot ito ng hanggang PhP 400 kada kilo,” DA-CALABARZON researcher and project leader Ginalyn D. Bocaya shared.

A total of 155 native pig growers from three Farmer Cooperatives and Associations (FCA) namely: Munting Sambayanang Kristiyano-Magsasakang Sinusunod ang Organikong Pagsasaka (MSK- MASINOP); Bonliw Farmers Association (BFA); and the First Nasugbu Natural Farmers and Irrigators Association (FNNFIA) were trained on raising native pigs



following the standards of organic farming and processing meat into saleable products such as tocino, tapa, longanisa, sausage, and embutido.

To date, two out of the three FCA have been certified by the Food and Drug Administration with license to operate, giving a better opportunity for their products to reach bigger markets, and turn native pig meat products more acceptable to consumers.

“Sa isa’t kalahating araw pa lang, nakabenta na kami ng meat products na nagkakahalaga ng PHP 6,091 at maliban pa rito, napakaraming nagtatanong at naging interesado sa aming produkto,” shared FNNFIA president Analiza A. Villarba after

joining the three-day DA-Organic Agriculture technology exhibit on 10-12 November 2023.

By promoting the availability of locally-produced and quality meat products utilizing native pigs in each respective partner-municipality, the technology intervention generated jobs for locals and increased the income of native pig raisers and processors. With the research-bred technology opening new

avenues of opportunities for farmers and entrepreneurs, advantages of native pig farming continue to expand—solidifying the commodity’s contribution to industry and the sector. ♦

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From the Region

GO WILD with *Wild Raspberry!*

EVELYN H. JUANILLO

The Philippine wild raspberry commonly called “sapinit” (*Rubus rosifolius* J. E. Sm.) is considered as one of the threatened endemic plant species. It can be found in Mts. Banahaw and San Cristobal in Quezon Province as well as in some parts of Laguna and Palawan. It is native to Asia and widely distributed in the tropics and thrives in forests with medium to high altitudes.

It is a pinnate leaved species that produces edible red berries. The climbing and prickly shrub reaches a height of 2-3 meters. The stems are pilose, sparsely covered with thorns 1-4 mm long. The fruits are subglobose, red and can be easily detached from the receptacle. Harvested from

January to April, fresh sapinit fruits can fetch a price from PhP 600 per kilo to as high as PhP800 when in season.

Besting berries through R4D

With funding support from the DA-Bureau of Agricultural Research, DA-Quezon Agricultural Research and Experiment Station (QARES) in Tiaong, Quezon, embarked on a series of research for development projects focused on boosting the production and utilization of sapinit.

Started more than a decade ago, sapinit R4D projects bore technologies that partners from Quezon still benefit from up to this day.

First of these is the project on production and utilization which DA-QARES implemented in collaboration with the National Agriculture and Fisheries Council (NAFC), and the Government of Japan.

It was conducted in situ in Sitio Bangkong Kahoy, Kinabuhayan, Dolores, Quezon. It partnered with the Rural Improvement Club (RIC) of Dolores, Quezon and developed a Package of Technology (POT) for increased sapinit production and utilization.

Successful methods of propagation are through cuttings and suckers and application of organic fertilizer at the rate of 500 kg/ha. The POT significantly

increased fruit size, fruit weight and yield of the sapinit plant. From their harvests, sapinit jams, juice, and wine were developed.

Multiplying berries' benefits

Sapinit has been recognized as an edible, delicious, healthy dietary fruit, and safe for consumption. In the Mt. Banahaw area, production and utilization of sapinit provided income for farmers which led to increase in demand for the sapinit berries. There is, however, difficulty in meeting the demand as the plant bears fruits only once a year and the fruits are very perishable.

This prompted the DA-QARES to undertake the second R4D project that focused on expanding production areas in support of product development and commercialization. The project was done in collaboration with selected local government units in

barangays Kinabuhayan and Sta. Lucia in Dolores and Infanta, Quezon. Project partners were mostly women belonging to rural improvement clubs from Dolores and Infanta, with 11 and 13 members, respectively. One additional group from Sitio Nangkaan, Sta. Lucia, Dolores, composed of 93% women, was added.

During its implementation, project found that there are two other sapinit species found existing in Infanta, Quezon—*R. fraxinifolius* and *R. luzonensis*. Despite their abundant growth, farmers and community members considered them as weeds due to lack of information. With the coordination and efforts of the LGUs and the local farmers in Magsaysay, Infanta, Quezon it was found out that said sapinit species were edible and can also be processed.

The project sought to establish 10 hectares of

R. rosifolius and expand areas planted to *Rubus fraxinifolius* and *Rubus luzonensis* by three hectares, and develop new products, such as tea and soap and establish at least one additional market linkage.

Flourishing fruits of the wild berry

The establishment of new plantations for sapinit required careful selection of project partners. They were trained on the POT for sapinit, which specifically focused on crop production and management, processing, and product development. Additionally, project partners received training on good manufacturing practices to ensure that standard procedures to maintain product quality were followed. The products were subjected to physico-chemical tests, and provided with appropriate packaging materials and design labels. Project partners were also provided with processing supplies and equipment. Marketing assistance was sought from the DA-Agriculture and Marketing Assistance Division in the region.

The project provided an additional source of income for the partners in the upland area, especially women who lack resources and are given limited function in cultivating land for their food. Other stakeholders who benefitted from the project include researchers, students, and other institutional partners.

DA-QARES turned over the results of the R4D to the concerned local government unit (LGU). To this day, the RIC of Dolores produces sapinit products every season through the LGU-provided processing facility. ♦



SAFEGUARDING THE PHILIPPINE INDIGENOUS *Fruits and Nuts* AT THE NATIONAL REPOSITORY

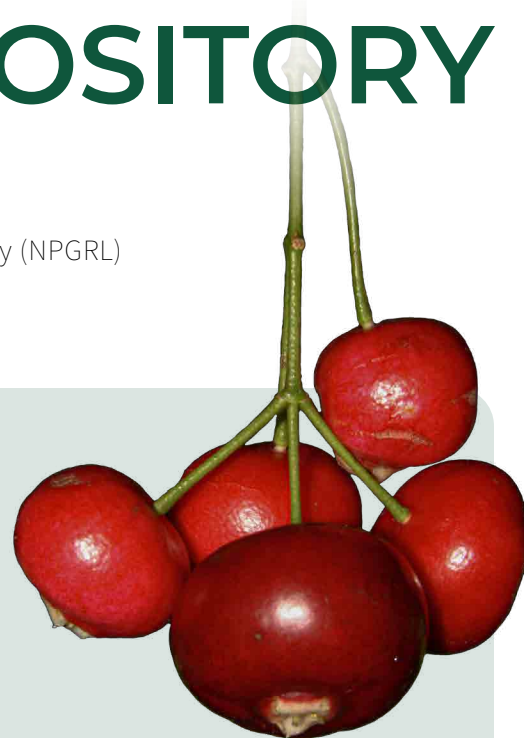
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Reported to be grown in the Philippines, there are more than 300 edible fruit and nut species in the country. Among these, five are considered major fruits (banana, pineapple, calamondin, papaya, and mango). About 30 species are considered economically important but not fully utilized. Also, the country has more than a hundred indigenous fruits and nuts, however none has so far become a major crop of national importance and

all are either underutilized, underexplored or totally neglected fruits.

There is a very limited research and development studies in realizing the full potential of these fruit species. This means that we are being dependent on less and less fruit species despite our diverse ecosystem. Genetic uniformity is sometimes catastrophic as it can cause significant damage once a particular



species or variety is found to be susceptible to a certain pest or a disease. A diverse ecosystem could prevent the rapid spread of a disease in a particular area.

What are indigenous fruits?

Indigenous crops are species native to or originating to a country or region, as well as those that have been naturalized through adaptation over many centuries of cultivation. Indigenous fruits and nuts

include species that are endemic to the country. In the Philippines, some of the identified endemic fruits and nuts species are pili, lipote, batuan, mabolo, katmon, paho, alupag, galo, among others. Indigenous fruits and

nuts species may also include species that are endemic to Asia and species that have been introduced in the Philippines long ago but have already been adapted to our local conditions.



Why indigenous fruits?

Indigenous species are adapted to local conditions and tastes. Mabolo (*Diospyrus blancoi*), also known as Philippine persimmon, has an edible white to cream flesh and velvety, reddish-brown peel. The timber of Mabolo, referred to by many as kamagong, has an excellent quality that is hard and dark colored and is being used as furniture: including doors, windows, tables, chairs, bed frames, etc. Some indigenous

fruits are also being used as souring ingredients for local delicacies. Batuan (*Garcinia binucao*) fruit is a popular souring ingredient in many Ilongo dishes, including KBL (kadios, babaoy, langka). Batuan fruits are also being processed as singang mix, powder, pickled, flakes, and as a flavoring for Piayaya. Katmon (*Dillenia philippinensis*) is also being used as a souring ingredient for sinigang and also being processed into sinigang mix, jam, and jelly. In Cavinti, Laguna, katmon is being added to lambanog (local coconut wine) as a flavoring ingredient. Lipote (*Syzygium polycephaloides*), Baligang (*Syzygium garciae*), Hagis (*Syzygium tripinatum*), and Bignay (*Antidesma bunuis*) fruits are being processed into wine, juice, fruit preserve, jam and jelly.

Indigenous fruits are sometimes being used for landscaping purposes. In Sta. Barbabra, Iloilo, there are Dillenia species to landscape their simple but beautiful park while Arius (*Podocarpus costalis*), an endemic tree with edible fruits, is a part of landscape architecture in most backyards homes and offices in Batanes. Pili is a popular endemic nut species with excellent taste, high nutritional content, tolerant to abiotic stresses, oil products for aroma therapy, and good timber quality, among its other good characteristics.

Most indigenous fruits and nut species are also resistant to pest and disease, hence, almost no pesticides are being used which makes them safer to consume. Many indigenous fruits are also reported to have high antioxidant properties linked to the promotion of good health. Since fruits are most eaten fresh, the vitamins and minerals are not destroyed making them an ideal part of the diet.





The house of NPGRL

The National Plant Genetic Resources Laboratory (NPGRL) was established in 1976 through Presidential Decree No. 1046-A as a component unit of the Institute of Plant Breeding (IPB), College of Agriculture and Food Science, University of the Philippines Los Baños. NPGRL serves as the center for plant genetic resources activities and plant germplasm repository of important and potentially useful agricultural crops.

There are currently more than 20,000 accessions of about 300 crop species being conserved as seeds, live plants, and in-vitro plantlets. The Laboratory aims to provide IPB and national crop improvement programs a broad range of genetic

resources for breeding of superior crop varieties.

The DA-Bureau of Agricultural Research (BAR) funded a project titled, Safeguarding the Philippine Indigenous Fruits and Nuts at the National Repository through Conservation and Use from 2019 to 2022. The project aimed to safeguard the Philippine indigenous fruits and nuts and to increase the diversity of the germplasm being conserved at NPGRL. It also aimed to minimize the rapid erosion and extinction of the Philippine indigenous fruits and nuts through conservation and evaluate their potential utilization.

Twenty-eight provinces in 13 regions were explored throughout the duration of

the project. A total of 314 accessions of fruits and nuts, belonging to 76 genera, were surveyed and 139 fruits and nuts accessions were characterized either on site or from existing collections. Aside from morphological characteristics, accessions were also subjected to proximate and functional analysis from which results will be used in further studies on their utilization.

In addition to conservation, two indigenous fruit varieties, namely IPB Katmon and IPB Hagis, have been registered to the National Seed Industry Council (NSIC). Seven indigenous fruit varieties namely: Baligang, Lipote, Kydia, Tampoy, Batuan, Kalumpit and Mabolo, were registered to the IPB-GTRRO.



RESEARCH FOR DEVELOPMENT
BARDIGEST

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