

RESEARCH FOR DEVELOPMENT

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Reviving Palawan mango industry through processing



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COVER PHOTO: RVENTURILLO/WPU

The Palawan mango industry is in shatters as the 35-year ban on the trading of the fresh fruit, and parts of the tree capable of harboring mango pulp weevil (MPW), outside the province has yet to be lifted.

While the management of MPW in the province has yet to see green light, Western Philippines University stood together with mango growers to revive the industry through processing of raw mangoes. The university has developed various value-added products that can be sold outside the province, and hopefully reach the export market.

We welcome and appreciate your comments and suggestions. Reach us via email ikm@bar.gov.ph.

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2007 Binhi Awards

Best News Magazine
2003 Gawad Oscar Florendo

Increasing farmers' productivity and competency through technology commercialization and upgraded R4D facilities

JUNEL B. SORIANO, PhD

Product marketability and facilities equipped with appropriate technologies are key factors that increase productivity, profitability, and competitiveness of farmers and fisherfolk. Various value-adding techniques and innovations are done in order to enhance the quality of products before making them available in the market. Likewise, R4D facilities are continuously being improved and modernized to ensure that they are able to keep up with the growing demand.

Relative to the two key pillars of the department, industrialization and professionalization, the Agricultural Competitiveness Enhancement Fund (ACEF) Research and Development (R&D) Grants target to significantly boost farmers' and fishers' livelihood through the provision of funds to the agriculture and fishery R4D activities of its partner State Universities and Colleges (SUCs).

In one of his messages, Agriculture Secretary William D. Dar highlighted the significance of having state-of-the-art R4D facilities in every region which will assist in upscaling technology commercialization. With the ACEF R&D grant, SUCs are being empowered to engage in more R4D ventures that will benefit our farmers and fisherfolk.

As the lead coordinating agency for all agriculture and fisheries research for development ventures, DA-BAR is tasked to provide technical support and assistance to the recipients and beneficiaries of the ACEF R&D grant. This includes, but is not limited to, initial screening of proposals; and monitoring and evaluation of the project's progress, financial, and completion report.

ACEF offers two types of grants: technology commercialization and R4D facilities upgrading. Technology commercialization grants aim to provide means for the transfer of mature technologies to generate income through sustainable enterprise development. In the same manner, grants that are intended for the development of R4D facilities are in support of the department's goal of modernizing the agriculture and fisheries sector.

Part of the technology commercialization grant are projects that are in support of one of the bureau's R4DE strategies to accelerate and generate agripreneurship from technology-based opportunities. These projects are formulated to ensure development, empowerment, and sustainability of agriculture and fisheries enterprises.

Further, the upgrading of R4D facilities component of ACEF complements one of the bureau's R4D strategies of providing support and investments that will further strengthen and enhance the capacity of stakeholders in R4D.

This issue of the BAR R4D Digest features various upscaling and upgrading strategies adopted and implemented by the SUCs as well as testimonies from the beneficiaries. Each page highlights a story of accomplishment— a realization of the implementers' goals and a fulfillment of the department's goal of a Masaganang Ani at Mataas na Kita for the farmers and fisherfolk. [◉](#)

AGRICULTURAL COMPETITIVENESS ENHANCEMENT FUND

Anchored on the Department of Agriculture's mandate to develop the agriculture and fisheries sector by addressing poverty alleviation and social equity, food security, rational use of resources, global competitiveness, sustainable development, people empowerment, and protection from unfair competition, the Congress enacted in May 2016 the Republic Act (RA) 10848, "An Act Further Extending the Period of Implementation of the Agricultural Competitiveness Enhancement Fund (ACEF)". It extended the ACEF's utilization until 2022. The fund was allocated for the implementation of three components: 80% for credit (loan) assistance, 10% as grants for the Research for Development (R4D) activities, and 10% for the Grant-in-Aid program.

DA-BAR, in 2018, was tasked to be the clearing house of project proposals for funding under the ACEF R&D Component.

In 2021, the Joint Memorandum No.01 Series of 2021 "Revised Implementing Rules and Regulations (IRR) of Republic Act No. 10848 (The ACEF Extension Law) Governing the Utilization of the Agricultural Competitive Enhancement Fund" was issued. Under Section III of the revised implementing rules and regulations (Fund Handling), the "Department of Budget and Management (DBM) shall release the Fund directly to the Land Bank of the Philippines, DA-BAR, and Commission on Higher Education, with respect to the program component they implement." Funds for the implementation of the ACEF R&D Component will now be directly downloaded to BAR.

The ACEF R&D Grant, which can be availed by qualified state universities and colleges (SUCs), focuses on the implementation of R4D projects to help increase productivity, profitability, and competitiveness of various priority agricultural and fisheries ventures.

Proposals submitted for funding are evaluated based on a set of criteria as defined in the IRR. At the minimum, the proposals in support to technology commercialization shall be implemented with identified farmers and fisherfolk cooperatives and associations as takers of matured and demand-driven technologies developed by the SUCs.

To ensure the technical, market, and financial viability of these technologies, the bureau requires results from its product/process development, various market assessments, and initial cost and return analysis. Meanwhile, for the research facilities development component, the proposals shall support production, post-harvest, and processing equipment/facilities for value addition and product development of priority commodities in their respective regions.

Proposals that pass through the screening process are forwarded to the ACEF Program Management Office (PMO) for endorsement and approval by the ACEF Executive Committee (EXECOM).

For the year 2018 to 2021, the program has funded 94 projects which consist of 45 projects in support to technology commercialization and 49 research facilities

development projects implemented by SUCs in various regions of the country. These projects covered rice, soybean, peanut, taro, onion, banana, tomato, purple yam, sweetpotato, sugarcane, chicken, swine, bees, seaweed, milkfish, *tilapia*, and mushroom commodities, to name a few.

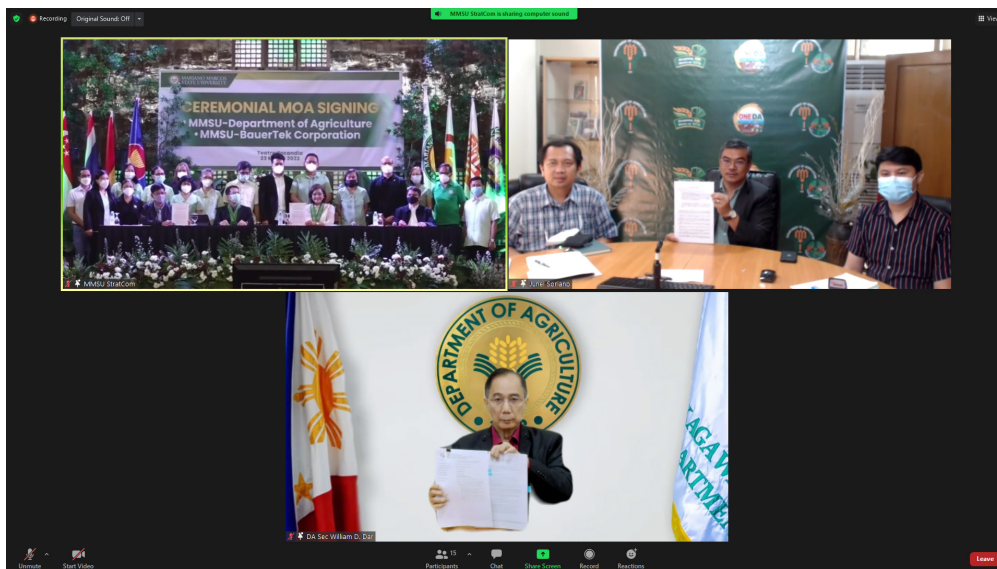
Among these projects, more than a thousand members from 47 Farmers and Fisherfolks Cooperatives and Associations (FCAs) were recorded as beneficiaries. Specifically, these beneficiaries received technical and business training to sustain the production and marketing of technologies they adopted. FCAs that have the capability to produce or process the products (e.g. has an existing facility) are supported through provision of minor equipment.

Moreover, to ensure market reach, some of the products developed are in the process of securing product registration from the Food and Drug Administration (FDA) which is a requirement in the marketing agreement

with institutional markets such as malls and groceries. Lastly, market linkage with various restaurants, manufacturers, distributors, and other market channels is established through agreements at the end of the project.

To further ensure the sustainability of the supported technologies, the data on the supply and demand of the inputs and processed products shall be established prior to the funding of the support to technology commercialization projects. This can be further supported by the business plan prepared by the project team which will be adopted by the partner beneficiaries for their developed enterprise.

Moreover, for the research facilities development component, the commitment, as well as the institutional capability to continuously implement and manage the project, are some of the evaluation criteria that the pool of experts uses to ensure that even after the project has ended, the operations and its purpose still continues. 🌱



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Brown and organic aromatic rice-based products: a farmer and health conscious to-go

MA. ELOISA H. AQUINO

The love for food and eating would sometimes lead to body weight increase or health concerns but nowadays people can enjoy food the other way around. How and why? People tend to be more health-conscious and think of alternative food they can dig in.

With Filipinos being rice-eaters, brown rice is a bubble for some. Brown rice gained popularity because of its impressive health benefits with its antioxidant properties and how it helps in obesity and diabetes management, among other things.

From a cup of organic rice and brown rice to rice-based products

Not only providing an alternative food for some with brown rice and also organic aromatic rice as their regular meals but putting a twist add value to produce. Central Luzon State University (CLSU), being in the country's rice granary, dedicated a hectare of land for the production of organic aromatic rice with other four hectares of land from independent farmers who were recipients of the technology on cultural management of organic aromatic rice and brown rice in Nueva Ecija.

With available sources, CLSU developed healthy, nutritious, and naturally-fortified brown and organic aromatic rice-based products in partnership with Researchers from the CLSU Ramon Magsaysay Center for Agricultural Resources and Environment Studies

(RM-CARES) and Rice Chemistry and Food Science Division of the Philippine Rice Research Institute (PhilRice).

“Taste, storage, and attractiveness issues of consuming brown rice can be addressed through this value adding activity. The production of rice-based products that are stable, healthy, convenient to use, and optimally aligned to consumer preferences might encourage both young and old and different socio-economic groups to consume rice-based products that use organic aromatic rice and brown rice as basic raw material not only during emergency situations but on a regular basis, thus increasing its demand,” said project leader Geraldine G. Tayag of CLSU's Department of Food Science and Technology.



These rice-based food products have optimized processing protocols suitable for scale-up production, and appropriate packaging materials for each product to ensure safety and stability.





Rice-based food products namely instant organic aromatic rice and brown rice porridge or *arroz caldo* with chicken are the innovative food products that are intermediate moisture. Dubbed as convenient food for the fast-paced lifestyle of Filipinos, they are easy-to-prepare food that cooks in 10 minutes.

Another product, Chips O'rayz, is the ready-to-eat high fiber cookies with parboiled rice that is low in glycemic index. Oatmeal, as another major ingredient, serves as a good source of dietary fiber. Meanwhile, other health-conscious individuals may get to enjoy, Rayz Krim, a non-dairy frozen dessert made with rice and soy milk, is vegan, lactose-free, and has zero trans-fat.

“These rice-based food products have optimized processing protocols suitable for scale-up production, and appropriate packaging materials for each product to ensure safety and stability,” she added.

Among the four products, the instant organic aromatic *arroz caldo* was the top-selling.

Improving rural livelihood through involvement

To fully operationalize and increase the production of value-added rice products, CLSU and Catalanacan Multi-purpose Cooperative (CAMPC) forged a memorandum of agreement—serving as the marketing arm of the project through Dairy Box Muñoz.

“The project is expected to stimulate the creation of new enterprise by capacitating farmers who shall provide not only innovative products but also job creation which contributes to economic development of people in the community,” Tayag shared.

CAMPC members attended hands-on training and seminars on good manufacturing practices, food safety, organic rice farming technology, and rice-based products manufacturing.

They are now directly involved in the regular production and manufacturing as products are being delivered and marketed in Dairy Box Muñoz.

Acknowledging CLSU-CHSI support to the cooperative, chairman

Ferdinand Cuevas hoped that the project continues as it serves as one of the additional sources of income of the cooperative.

The road ahead

Funded under the ACEF being coordinated by DA-BAR, the scaled-up processes for the four rice-based products are also parallel to selecting compatible packaging materials and labels for the products. The team already filed one trademark application and two utility models for the formulations of two rice-based products.

“Results of the financial analysis of the base scenario where 75% of the current capacity is utilized shows that the project is feasible and worth pursuing regardless if it will be 100% financed or be financed with a loan since the IRRs (16.96% and 28.93%) are higher than the WACC (8.65%),” Tayag explained. 🍌

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Reviving Palawan mango industry through processing

RENA S. HERMOSO



PHOTO COURTESY OF WPU

Mango ranks third after banana and pineapple as the most economically important high-value crop. In a press conference on 8 June 2022, the Department of Science and Technology-Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development unveiled nine new mango varieties and selections. This development is expected to strengthen the Philippine mango industry by providing an alternative to Carabao mango, the only variety

commercially grown for both local and export markets.

While Carabao mango leverages on being one of the finest and sweetest mangoes in the world, relying on one variety for export is risky. If something happens to it, like a serious pest infestation, the entire industry will suffer. Something similar to this has happened in Palawan.

For the past three decades and five years, the whole Palawan island

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To work around the restrictions, one of the best options for them is to strengthen the processing of raw mango into value-added products.

has been under quarantine due to the presence of mango pulp weevil (MPW) in the southern part of the province. Trading of mangoes outside the province, as well as movement of fresh fruit and any part of the mango tree capable of harboring MPW are banned.

MPW is a brownish black snout beetle that digs into the mango flesh leaving the fruit inedible. Its damage is hard to see until the fruit is sliced open.

Worse, in December 2020, authorities have reported that MPW was inching towards the northern part of Palawan with confirmed cases in six barangays in Roxas. Before this development, an inspection checkpoint was located at Puerto Princesa's northernmost boundary, Langongan or the last barangay before you reach Roxas.

While there are a lot of factors that contribute to continued infestation of MPW in Palawan, something has to be done to revive the local mango industry. To work around the restrictions, one of the best options for them is to strengthen the processing of raw mango into value-added products. In this way, the local industry can recover by selling processed mango products outside the province, and at the same time hoping to reach the export market.

The Western Philippines University (WPU), through funding from the DA-Bureau of Agricultural Research, developed a two-step dehydration process using a developed sun dryer dome and mango by-product processing protocol to produce vinegar and wine.

The project aims to commercialize processed Palawan mango products by upscaling its

production, refining its package and label, enhancing the capabilities of identified partners, and establishing market linkages.

The Tagumpay Agrarian Autosavings Multi-purpose Cooperative (TAASMPC) and Aborlan Food Processors Association were the recipients of the project. They shall adopt the technologies introduced by WPU, as well as produce, commercialize, and mainstream the value-added mango products.

The research team facilitated extensive training of 94 farmers and mango processors on the following: mass production of dehydrated mangoes; processing of mango vinegar, mango-turmeric juice, dehydrated mango cubes; and business plan and financial viability.

In collaboration with the regional offices of Department of Trade and Industry, Department of Agrarian Reform, Department of Science and Technology, and City Agriculture Office of Puerto Princesa, the research team also conducted a series of training writeshop on Current Good Manufacturing Practices and Sanitation Standard Operating Procedure to prepare the farmer groups for their license application to Food and Drug Authority.

“Through the various training conducted, the processors were capacitated to compete in the market through improvement in product packaging and linkage to different business partners,” said project leader Anne Gellie P. Pablo.


She added, “As the tourism sector in Palawan slowly gets back to its feet, the mango processors have started mass production and are actively participating in trade fairs.

TAASMPC's products, with brand name Produktong Tagumpay, are available in malls, airport, and pasalubong centers all over Palawan.”

The Food Research and Innovation for Extension, Nutrition, Development, and Sustainability, the extension program of WPU, continued to guide the farmers and mango processors after the project completion.

“We are also exploring the utilization of other mango species in the province, in the hopes of offering a variety of products showcasing not just the Carabao mango but also other species such as *huani* and *mampalang*,” shared Pablo.

Meanwhile, TAASMPC members Arlyn C. Labesig and Lysa D. Alcibar expressed their gratitude toward the research team and WPU for their assistance and efforts to improve their livelihood and products.

“Ang DA-ACEF mango project ng WPU ay isang proyekto na malaking tulong sa aming kooperatiba. Tumulong at nagkaloob ng dagdag puhunang pangkabuhayan sa amin. Hindi lamang sa pagbibigay ng raw materials [at] ingredients pati technical assistance para mas gumanda at umayos ang aming produkto. Dahi dito mas nag-improve ang aming produkto gaya ng dehydrated mango, vinegar, at iba pang produktong mangga na aming ginagawa,” shared mango processor and TAASMPC member Catherine C. Palay. 

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Establishing a competitive legume-based startup through TBI

DIWA J. VELASQUEZ



Peanut and soybean are two of the major legumes grown by farmers in the Philippines. According to the DA-Bureau of Plant Industry in 2014, peanut ranks as the 13th most important food crop with 50% of it being used as raw material for the manufacture of peanut oil, 37% for confectionery, and 12% for seed purposes.

However, in soybean production, the supply for the local market is still insufficient which includes soybean oil and meal used by food and feed industries. In this regard, one percent of the total market soybean consumption is locally produced which alarms the need to increase production. The alternate cropping and intercropping for cereals and fruit trees respectively may help in attaining optimum yield since the soybean crop is a leguminous plant that is a good natural enhancer.

There were also farmer organizations that lack capital

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CVLTBI functions as a startup enabler that will nurture and bridge the gap between the legume industry and university research and innovation through technology generation and transfer, providing technopreneurial training and linkage to the startup ecosystem.

for business expansion, and weak marketing support given that legume production remains profitable if guided by proper management and efficient knowledge transfer.

“Though there is a notable increase in the local production of legumes, other support to the primary activities along the supply chain is still needed to be developed and strengthened particularly maintaining good quality seeds, production, postharvest and processing technologies, and market linkages of the industry players to the farmers,” said project leader Dr. Jose D. Guzman of Cagayan State University (CSU).

He also emphasized that the project between the DA-Bureau of Agricultural Research and research institutions helped in increasing the farmers’ awareness of the technologies developed.

TBI as a tool to utilize technologies from research and development works

Technology Business Incubation (TBI) assists in linking innovation to profit. It is expected to serve as an incubation hub that focuses on innovation and technopreneurial support services. Through the project, titled Cagayan Valley Legumes Technology Business Incubator (CVLTBI), technology generators (researchers, faculty/staff, students, innovators, other research institutions, and the community) and takers (farmers, farmers organizations/cooperatives, processors, traders, and manufacturers) will be able to establish a competitive legume-based startup and strengthen the ecosystem.

CVLTBI functions as a startup enabler that will nurture and bridge the gap between the legume industry and university research and innovation through technology generation and transfer, providing technopreneurial training and linkage to the startup ecosystem.

Dr. Guzman discussed the operation framework of TBI relevant to the project—incubatees (technology generators) in the pre-startup phase will be nurtured to come up with a viable market-driven technology, while incubatees (technology takers) in the startup phase will be equipped to become competent entrepreneurs.

The TBI allows the incubatees to increase their income and annual sales by 10% every year as well as their annual capital investments, and increase return of investment by 50%.

CVLTBI also provides technopreneurial expert services, mentorship programs, business location, business registration, license support, product processing support, access to funding and investment, business partnership development, and office space and laboratories for non-incubatees.

Establishing CVLTBI

To establish the CVLTBI, the project team conducted technology pitching activities to identify highly qualified technology generators with innovative technology solutions. In addition, meetings and monitoring activities for incubatees, and series of entrepreneurial and management training were provided.

A series of demonstration fora on peanut production and postharvest mechanization technologies developed by CSU, particularly the peanut stripper cum pod sorter, peanut sheller-sorter, aerated peanut bulk storage, peanut weeder, peanut pod sorter, and peanut digger were held in different peanut-growing areas in Ilocos Region, Central Luzon, and Western Visayas.

Moreover, several farmer groups and processors were involved in the project, namely Buenavista Multipurpose Cooperative, Inga Farmers Association, SQA Food Products, Teresita Cuntapay Food Products, and Eightine's Bakeshop. The groups undergone screening, assessment and evaluation, and attended trainings on the incubation program, drafting business deals, and business planning.

The CVLTBI provided assistance in technopreneurial activities, promotional and marketing activities, research and development services, and sourcing of seed funding. For SQA Food Products, the project assisted in improving its peanut processed products by providing the Peanut Sheller-Sorter and Bulk Storage.

As the project continues, several cooperatives and associations from Isabela, Cagayan Valley, Iloilo, Ilocos Sur, and Ilocos Norte will be next in line to benefit from the entrepreneurial assistance and product development and market promotion of the technology. 🌱

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Heart-healthy cream soup on its way

ANGELO N. PADURA

“A primarily fish-based diet is ideal for people suffering from cardiovascular disease. Milk casein, celery, and fish oil have been found to mitigate cardiovascular and other lifestyle diseases. These three functional food ingredients were incorporated into an instant fish cream soup formulation, resulting in a fish-soup comparable to commercial soup products,” Nueva Vizcaya State University (NVSU) professor and project leader Dr. Chery Cabading Lacaden said.

According to the Philippine Statistics Authority, coronary heart disease remains the top cause of death in the country from January to November 2021 despite battling with the COVID-19 pandemic. Fish, being an excellent source of Omega-3 fatty acids, helps in reducing the risk of cardiovascular diseases.

Meanwhile, instant cream soup is one of the fast-growing comfort food items available on grocery store shelves. In a study, the global soup market is expected to grow at a consumption growth rate of 3.7% during the period 2016-2021.

However, among the wide variety of cream soups commercially available, not a single comfort food item features fish.

Since the construction of the Magat dam, tilapia fish production metamorphosed into an industry over the years. Whether fresh or frozen, *tilapia* is a good raw material in making dehydrated fish flakes essential for the formulation of an instant fish cream soup.

This is how a product value for *tilapia* fish was created and advanced by NVSU in 2009 under the support of the DA-BAR and the provincial local government unit of Nueva Vizcaya.

Aimed at producing and commercializing an instant *tilapia* fish cream soup under the brand name SpoonDigo, the DA-BAR-funded project was able to produce 80,000 packs of fish cream soup. Further, it generated at least 15% return on investment and capacitated its technology adopter, the College of Business Education Entrepreneurs Savings and Credit Cooperative (CBEESCC), to ramp up their production and augment their profit.

The NVSU team introduced two sets of prototype products to consumers and food technology consultants during the initial phase of the project. After rigorous evaluation and consultation with the food technology experts, the cream soup underwent reformulation of its ingredients. Consequently, the product had a major qualitative improvement and extended its shelf life from 6 months to 24 months.

“In preparing the instant *tilapia* cream soup, the *tilapia* fish is placed in boiling water for three minutes. Next, the fish is turned into flakes which will be dried in an oven. Afterwards, the dried fish flakes are turned into fish powder. The powder’s moisture is maintained very low before mixing it with seasoning and other ingredients. Finally, the instant *tilapia* cream soup is all set,” Dr. Lacaden explained.

The NVSU project team together with CBEESCC, in collaboration with the NVSU Sabatan and College of Business Education, facilitated the activities for the soft launch of the product on 27 February 2021 at NVSU which was followed

by the successful grand launch on December 17 of the same year at the Nueva Vizcaya Provincial Convention Center. Distribution outlets were established among merchandisers such as the NVSU Multipurpose Cooperative, Nueva Vizcaya One Town One Product (OTOP) Pasalubong Center, Agrizcaya Multipurpose Cooperative, Datu's Store, and One Vizcaya Inc. and Doc's Pharmacy.

Based on an approved training design, titled Awareness on Food Safety and Hazards Analysis Critical Control Point, capacity building on instant *tilapia* cream soup processing training was conducted among members of the CBEESSC to strengthen their production and entrepreneurial skills.

To further capacitate skills, the members of the cooperatives and beneficiaries were involved in a series of financial literacy and entrepreneurship programs of the Heirit Sabatan. A training on "Fish Cream Production, Costing and Pricing" was also participated in by women members of the RIC, Nueva Vizcaya Fish Growers Association, other *tilapia* growers, and agribusiness students.

In March 2022, the Spoodigo trademark received its registration from the Intellectual Property Office of the Philippines while the application for the utility models on the composition and process in making the instant *tilapia* cream soup are still in progress. Spoodigo welcomes further product improvement and consumer evaluation. With its high potential being noticed, several business enterprises and private partners have expressed their willingness to support the commercialization of the product.

"If reasonably-priced, attractively packaged, and actively promoted and advertised in both the print



and broadcast media, Spoodigo has the potential of becoming a ubiquitous food item in every pantry not only throughout the province of Nueva Vizcaya, but also in the Cagayan Valley Region and eventually perhaps, in the entire nation," Dr. Lacaden said.

With the hopes of full production for Spoodigo, Dr. Lacaden mentioned that an enhanced and better market for Nueva Vizcaya's fisherfolk, especially *tilapia* growers, can be actualized in the next years to come.

"On top of its total costs, an estimated net income of PHP 535,000 can be generated and a promising 19% return on investment. Ultimately, the research-bred technology shall contribute to food security not only among people living with the risk of cardiovascular disease, but to every working person and student who are always on the go," she said. ◉

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TMR as a solution to increase dairy productivity

RENA S. HERMOSO



During the early part of 2022, Agriculture Secretary William D. Dar instructed the dairy industry to ramp up the production of local milk to meet the demand, as the country heavily relies on importing dairy products. He instructed the DA-National Dairy Authority (NDA) and the DA-Philippine Carabao Center (PCC) to restrategize their plans and actively partner with the private sector.

In line with this pronouncement and acknowledging the need to aid the dairy industry through research and development, the Isabela State University (ISU) has long been developing technologies to improve the productivity of dairy animals. One of the strategic interventions that they have developed was the total mixed ration (TMR), a feed mix that contains all the nutrients a dairy animal needs. It combines crop residues, forages, grains, protein feeds, minerals, vitamins, and feed additives formulated to a specific nutrient concentration.

Feeding TMR to dairy animals ensures that it receives balanced nutrients essential for good health, hence, increasing and stabilizing the milk production. This technology has been the most adopted method of feeding high-producing and indoor-housed dairy cows

The use of TMR as feed sources is commonly practiced by large dairy farms, but used as green fodder by small scale farmers. This market therefore would be a niche and is expected to grow as climate change worsens.

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in the world. Locally, a private company sells it to interested dairy farmers.

However, there is a need to provide our smallholder farmers with a more affordable TMR option that not only maximizes the technology but also utilizes the available resources in the region.

“The use of TMR as feed sources is commonly practiced by large dairy farms, but used as green fodder by small scale farmers. This market therefore would be a niche and is expected to grow as climate change worsens,” explained ISU professor Dr. Nilo E. Padilla.

In a rice and corn producing province like Isabela, one of the perennial concerns of the farmers is the underutilization of crop residues such as rice straw and corn cobs for ruminant production during the lean months.

“These crop wastes are abundant year-round but due to [its] low nutritive value and low digestibility, it has not been maximally utilized for ruminant production. By adding crop residues to a TMR feed mix, [its] cost can be significantly reduced without sacrificing the nutrient value,” said Dr. Padilla.

ISU specifically developed a TMR technology that addresses both issues. To hasten its commercialization, the university entered into a technology licensing agreement with Central Isabela Agri-Manufacturing Corporation (CIAMC) through a project supported by DA-Bureau of Agricultural Research in 2019.

Led by Dr. Padilla, the project also aimed to upscale the commercial production of TMR feed mix, as well as develop a

viable business model with a market strategy to ensure project continuity and stability.

ISU trained the members of CIAMC and partner dairy cooperatives, Malaya Dairy Cooperative (MDC) of Mallig, Isabela and Sinaoangan Sur Dairy Cooperative (SADACO) of San Agustin, Isabela, on the production and use of the TMR technology. The training was a combination of experiential learning, coaching, and mentoring sessions.

The project team also did an exhibit feeding to showcase the changes that TMR can bring to their dairy animals. These include improved physical appearance, greater body weight, longer lactation period, increased calving efficiency, and lower calf mortality.

Through these activities, the dairy farmer cooperators were convinced to adopt the TMR technology.

“Dati ang pinapakain namin [sa alagang baka at kalabaw] ay carabao grass, legumes, at kakawati. Pero sa tulong ni Dr. Padilla, gamit ang teknolohiyang [TMR], tumaas ang produksyon ng gatas at tumataba ang mga alaga naming baka at kalabaw,” shared MDC chair Filipina B. Lacatao.

“Wala kaming ideya na lahat pala ng patapon[g bahagi] ng mais ay pwedeng ihalo [sa] pagkain ng mga alaga namin gamit ang teknolohiyang TMR...Naging matagumpay ang kanilang proyekto sapagkat ang aming kooperatiba ay isa na sa mga nagsu-supply ng gatas sa bayan ng San Agustin,” said SADACO chair Genielex T. Raymundo.

“The Nutrient Analysis revealed that the TMR technology has

a higher nutrient content than the feeding practices of our farmer cooperators. We also conducted a pre- and post-test on the feeding to ensure that our technology has a higher contribution to the nutrients and body requirement of the dairy animals,” explained Dr. Padilla.

From the business perspective, operating an enterprise that produces and sells crop residue-based TMR feed mix is feasible and highly profitable with a projected 50.39% return on investment based on a five-year operation.

The proposed enterprise will be operated and managed by CIAMC for five years targeting 55% of the local TMR consumption of dairy animals in the region. It needs PHP 1,550,000 capital, 33.33% of which will be used to acquire the facilities and equipment, while the remaining 66.37% will be for the operation cost.

“The enterprise has a short period of recovery of its initial investment of around two years and 1.56 months. It is a very favorable enterprise to an investor,” said Dr. Padilla.

“ISU is always innovative with their ideas. *Napakaswerte ko sapagkat naka-establish ako ng partnership sa kanila sa tulong na rin ng DA-ACEF. Promising ‘yong technology at nakapagbibigay tayo ng tulong. Hindi lamang mapataas ang produksyon ng gatas* but it also provide[d] additional jobs *sa ating mga farmers,”* shared CIAMC CEO Eugene T. Gabriel. 🍌

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From backyard to market; the bright future of Hawaiian mango

ANGELO N. PADURA

Have you ever imagined a summer in the country without indulging into the taste of one of the all-time favorite fruits – mango?

Mango is a fruit tree that thrives in nearly all types of soils across the country. Due to technologies generated by researchers such as fertilization, flower induction, pruning, and several cultural management technologies, the production of mango has gone up in the country. Thus, mango growers are motivated to produce more mangoes because of the supply and the variety of processed products that can be derived from it.

Revealed by the Major Fruit Crops Quarterly Bulletin in 2018, the Ilocos region is the top mango producing region with 55.6% contribution to the total national production. Among the common varieties of the fruit, the native mango (also known as Carabao mango) dominates the local and export industry making it one of the high-value Philippine crops. Carabao mango comprised 81.8% of the total mango output in the first quarter of 2018.

While efforts are concentrated on increasing the quality of the in-demand native mango produce, there is another mango species that is beaming with fruits even

without farmers' intervention. The tree bears fruit in three phases per season, thus availability of the fruit stretches to five to seven months. Hawaiian mango, that is.

“The Hawaiian mango tree blooms flowers much earlier than the native mangoes and bears fruit at three tranches. As a result, the fruits become available in a longer period of time as compared to other varieties of mango,” said Ilocos Sur Polytechnic State College (ISPSC) professor and project leader Dr. Gloria D. Tuzon.

“More importantly, growing this variety of mango does not require fertilizer and was observed to be more resistant to pests than the native mangoes,” she added.

Funded by the DA-Bureau of Agricultural Research, ISPSC has developed technologies utilizing the Hawaiian variety of mango into juice, puree, jam (from the *sapal* or by product in juicing), and pickles.

The project, titled Commercialization of Mango Juice technology aims to utilize the Hawaiian mango variety that has wide potential for processing and is abundant in the country. Further, it is expected to improve the lives of farmer-cooperatives and mango growers



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The Hawaiian mango tree blooms flowers much earlier than the native mangoes and bears fruit at three tranches. As a result, the fruits become available in a longer period of time as compared to other varieties of mango.



in the communities where the juice processing enterprise was established.

The journey to producing the all-natural and ready-to-drink Mango juice drink starts within the orchards. With every Hawaiian mango tree that is beaming with at least 500 kilograms of fruits in a season, the raw material in making the juice drink is on the get-go. Next, the mango puree is prepared from the harvested fruits. Lastly, the puree is diluted with purified water, syrup, and calamansi juice. The calamansi acts as a stabilizing agent and enhances the sweetness of the mango which makes the juice drink very acceptable.

Anchored on the goal to upscale the production of the Hawaiian mango juice drink, ISPSC conducted a market acceptability

test. Based on the result of sensory evaluation, the juice drink had a very high level of acceptability among intended consumers. The processed mango juice was already launched in several markets such as in Tagudin and Santa Maria, Ilocos Sur. Likewise, it was used as a main drink served during ISPSC activities especially to guests coming from other regions.

Based on the initial evaluations, the Hawaiian mango processing technology developed could be a profitable venture when commercialized. Sensory qualities of the developed product indicated a high level of acceptability by consumers which is attributed to its organic and low sugar contents.

Further, the result of financial analysis showed a high level

of profitability which gained the interest of the partner cooperatives to commercialize the technology.

With an investment cost of PhP 370,760, the technology offers 37.09% return on investment amounting to PhP 137,548.80 average annual net income.

The project initially benefited a total of 100 members of the Tagudin Samahan ng Magkalamansi Producer's Cooperative and will soon involve the Suyo Mango Growers Association as a potential source of raw materials. 🌱

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From lab research to technology transfer: Daerrys tilapia ice cream and tilapia cookies

REMARYJAY V. NEYPES



"Let's continue to be TechNovative—continuous technology innovation and development to make a difference in the lives of our countrymen," this is the principle of Dr. Dana Vera Cruz as she leads the research team in the continuous development and technology transfer activities of *tilapia* ice cream products.

Taking off in 2015, Central Luzon State University (CLSU) developed various *tilapia* products. With an initial 150 cups of *tilapia* ice cream, it now gained popularity. DA-BAR, through its National Technology Commercialization Program, supported the technology enhancement and commercialization of *tilapia* ice cream along with other developed *tilapia* products.

Through the Agricultural Competitiveness Enhancement Fund (ACEF), CLSU received a Php 5M research grant in 2020 to further boost the production and marketing of Daerrys Tilapia Ice Cream through upscale production and commercialization.

The Manggagawang Bukid ng Guimba Agriculture Cooperative of Nueva Ecija (MABUNGA Coop), as the project beneficiary, worked on the technology transfer, particularly on the *tilapia* grow-out production to *tilapia* processing.

MABUNGA members gained capacity in several aspects of *tilapia* production via the project's training and seminars, including *tilapia* grow-out management, good manufacturing practices, food safety and sanitation, *tilapia* processing, packaging and labeling, and business planning. MABUNGA Coop was also able to design and finish its business strategy development and Business Model Canvas for *tilapia* products as an incubatee of the CLSU Agriculture and Food Technology Business Incubator.

MABUNGA Coop managed the initial 5,000 pieces of fingerlings for *tilapia* grow out production last May 2021 and another 3,000 pieces on November 2021. Through the assistance of the Freshwater Aquaculture Center, the members of the MABUNGA Coop were capacitated in the actual management of the *tilapia*

grow-out production. After each harvest, the members were capacitated in the *tilapia* filleting activities. As a result, they could produce vacuum packed Daerrys Tilapia Fillet that will be supplied to manufacture the Daerrys Tilapia Ice Cream and Tilapia Cookies.

The cooperative is now part of the supply value chain in the upscale production of Daerrys Tilapia Ice Cream—providing a good source of revenue. Aside from the *tilapia* fillet, the cooperative was able to sell also the trimmings like the head, belly, and skin of *tilapia* as an additional source of income.

Their vacuum-packed product *tilapia* fillet is subject to nutritional analysis and shelf-life determination as part of the project's deliverables. The said analysis is needed to prolong the *tilapia* fillet's shelf life and maintain its quality as well.

This *tilapia* fillet can now be processed to Daerrys Tilapia ice cream downstream products, including regular/classic *tilapia* ice cream (cups), *tilapia* ice cream sandwich, *tilapia* praline crunch, and Fingerleengs *tilapia* cookies.



In addition, new items such as the chocolate-coated Fingerleengs *tilapia* cookies and the Fryewich, a chocolate-coated *tilapia* ice cream sandwich, were developed as part of the research.

In March 2022, the spin-off company, the Vera Bella Enterprises Limited Company, was granted by the Food and Drug Administration (FDA) a License to Operate (LTO) to manufacture the Tilapia Ice Cream and Tilapia Cookies. With this initiative, the MABUNGA Coop will continue with their *tilapia* grow-out and *tilapia* processing activities to ensure the sustainability of the raw materials. Part of the business plan is to secure its own LTO from FDA for the *tilapia* processing activities. They are now in the process of upgrading their *tilapia* processing area to conform with the FDA standard.

Daerrys products are now available at CLSU and Milka Krem and are currently seeking more distributors around the country. Its global commercialization is also on deck with the Joint Venture Agreement with the PWD Smart Farmability, Malaysia.

“The Daerrys Tilapia Ice Cream downstream products now have a noble purpose, as the PWDs of Malaysia will champion these products to humanize the PWDs and through the project ‘Feeding Without Borders’—a collaborative effort between PWD Smart FarmAbility and World Humanitarian Drive UK,” Dr. Vera Cruz shared.

The laboratory works that initially gained local recognition and international awards now makes a sound through invitational talks about the technology here and abroad.

“Through partnerships and linkages with various stakeholders and to what extent the technology developed made a difference in the lives of the people in the community. Indeed, technology transfer can support the pillars of the global economy like innovation, knowledge, technology, and even enterprise development,” Dr. Vera Cruz said.

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 Let’s continue
 to be
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Mango, cacao blended beverage as a value-adding seaweed product

GELINE NICOLE A. MORILLO

According to the Philippine Statistics Authority in 2022, seaweed is considered as one of the top aquaculture commodities in the Philippines along with milkfish and *tilapia*. Abundant in the waters of Cebu, it has been identified by DA as one of the region's primary products. With the region as one of the few processors of seaweed, several innovative strategies have been carried out in order to maximize the utilization of this resource. The uplifting of seaweed production in Central Visayas is expected to generate livelihood and increase the income of farming families in the coastal communities.

Primarily, the only seaweed product being produced by seaweed farmers in the region is carrageenan, a gelatinous extract used for their gelling, thickening, and stabilizing properties. However, several concerns from the farmers have been raised, such as the time-consuming postharvest processing that it undergoes. Additionally, they wanted to have other options for selling the seaweed in the market with



PHOTOS COURTESY OF CTU

lesser cost of production and a higher return on their income.

In the hopes of maximizing the potential of seaweed as a superfood and exploring other means to utilize this resource as an additional income-generating product, the Cebu Technological University, in collaboration with Food Technologists of the Southern Leyte State University, has proposed a study titled, Technology Commercialization of Blended Beverage from Seaweed (*Eucheuma spinosum*) and Selected Tropical Fruits



(*Mangifera indica* Linn and *Theobroma cacao*).

From coast to cup

Around 2018, the group was invited to a program hosted by DA-BAR, where the bureau presented the ACEF priority commodities for the region. This prompted them to innovate and formulate a product that utilizes seaweed produce and likewise showcases other commodities of the region, in particular, mango and cacao. Hence, the conceptualization of the Wellness Blends, with Mango and Cacao as the flavor variants.

As the product initially took off, the group was already in the stages of developing additional blends and exploring more flavors. Further, they are seeking other possible packaging options that will lessen production cost and ways on how they can prolong the shelf life of the products. Likewise, they are facilitating the process of acquiring an FDA approval for a wider marketability and expanded consumer reach.

How seaweed flourished the life of farming communities in Cebu

Tamiao Seaweed Farmers Association from Brgy. Tamiao, Bantayan Island, Cebu served as their main supplier of fresh seaweeds while members of the Colonia Women's Association from LMPC Cocohub, Brgy. Colonia, Tuburan, Cebu are the processors and producers of the beverage.

Through a series of training sessions, the beneficiaries have been equipped with needed knowledge and skills that will allow them to sustain and improve the production of seaweed in the area.

When asked about how this experience changed her livelihood, Dina Condiman, a member of the Colonia Women's Association, shared "...ang pagkakaroon ng ganitong experience ay hindi ko maihalintulad sa kahit ano pa mang trabaho na napasukan ko, dahil sa

karanasang ito nagkaroon kami ng maraming ideya na kahit ano dito sa mundo maliit man o malaki ay may halaga, katulad nang seaweeds [na] akala ko lang noong una ay sadyang pagkain lamang pero nalaman ko ngayon na ang maliit na bagay na ito ay may mahalaga palang papel na ginagampanan, [at] pwede palang maging isang inumin dahil maraming health benefits na taglay."

Jesson Tamondoc of the Lamac Multipurpose Cooperative, the cooperative that coordinates with the Colonia Women's Association, shared some of the challenges they encountered along the way, citing, "*Sa produksyon ng produkto sobrang dami kong naranasang challenges; [isa na rito ay] kung paano namin siya ma-introduce sa market at anong [pwedeng] gawin para mas tumagal pa ang shelf life."*

With this, the implementers are continuously seeking innovations on how they can prolong the shelf life of the products.

The Wellness Blends Guso 200 mL sells at PhP 35 per bottle. With the higher sales of the tablea flavored beverage, the project team hopes to put more focus on improving the production of the cacao blend. 🍷

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A fish and a dream: How Milkfish Processing Technology slowly changes lives in Bataan

KATHLEEN MAE B. BULQUERIN



PHOTOS COURTESY OF BPSU

Milkfish or *bangus*, the country's national fish, is a tough fish species that thrives in tropical and warm temperate waters. This makes it an ideal aquaculture produce for anyone interested in growing *bangus*.

The majority of milkfish produced in the Philippines is consumed domestically. Milkfish products are available frozen or fresh, and are commonly eaten dried, smoked, and/or fileted. The Philippine milkfish, which is typically served in a Filipino household, is a huge hit in countries, particularly those populated by Filipino immigrants and workers.

According to a 2018 report of the Philippine Statistics Authority, milkfish production contributed 66.01 metric tons in the first quarter. Bataan is the fourth largest producer of milkfish in Central Luzon, with at least 8.58 MT produced in 2018.

Currently, the Bataan Peninsula State University owns a 27-hectare fishpond in the town of Orani which they use for their fishing business.

Recognizing the value chain in milkfish, they recently inaugurated the BPSU Fish Processing Center which was funded by DA-BAR,

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Malaking tulong po itong project na ito sa ating target beneficiaries, since meron po silang stable income.

recognizing the enormous potential of quality processed fish.

With the intent to generate quality, safe, and appropriately packaged soft-boned fish products, BPSU led the implementation of the “Milkfish Processing Technology Refinement towards Upscaling and Commercialization” project.

The soft-boned fish technology is an innovation in fish processing that produces commercially-sterile, soft-boned fish products.

According to one of its proponents, the project serves as a ‘win-win’ for everyone involved.

“*Malaking tulong po itong project na ito sa ating target beneficiaries, since mayro’n po silang stable income,*” said Mark Nell C. Corpuz, one of the project’s proponents.

This project aided the technology adopters, Orani Peninsula Producers Cooperative (OPPro), in scaling up and commercializing enhanced milkfish smoked and bottled products.

The selected technology adopters then participated in a series of capacity-building activities over the course of eight months to improve their skills and knowledge on soft-boned fish technology and entrepreneurial operations. Additionally, improvements were made to the branding, packaging, and labeling of fish products.

Speaking to the project's technology adapters, OPPro members from the Kalipunan ng Liping Pilipina Inc.; Samahan ng mga may Kapansanan; Orani Single Parents Group; fisheries faculty and students; and fisherfolks expressed their gratitude for being chosen for the project.

“*Masaya po kasi mayro’n po kaming pinagkakaabalahan. Hindi rin naman po kami gaanong nahirapan (sa technology) kasi talagang nakatutok sila sa amin,*” said one of the beneficiaries.

As of writing, the products from the project are showcased in various trade fairs and exhibits.

“*Ay world class po ang produkto namin. Noong nakaraan po ay may nag-order sa min ng 80 pieces kasi dadalhin nila sa Italy,*” said one of the beneficiaries.

To ensure that the project's products are launched for commercialization after the pandemic, the BPSU Technology Business Incubator began a licensing agreement with the OPPro beneficiaries.

When asked if the project is limited to milkfish, the proponents stated that it is just one of many.

“*Una lang po ito. In a way we are just testing the waters. If this (project) is successful, then we can replicate it to other aquatic species, specifically fish po,*” said one of the proponents.

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Upgraded Tissue Culture Laboratory for quality banana planting materials

MARIA ELENA M. GARCES



PHOTO COURTESY OF QSU

With rice, corn, and banana as the major crops produced by the local people, the economy of Quirino province is basically agriculture-based. It was reported that from the estimated 41,812 hectares used for agriculture, banana production covers almost 5,000 ha with at least 4,000 individuals as workforce.

In the late 1990s, banana production hit the highest point, but was toppled over by a disease called banana bunchy top virus (BBTV) affecting large areas of banana plantation in the province, almost wiping out the estimated 5,000 ha banana production. The infestation resulted to decreased

income of banana farmers and shifting to other livelihood project.

Improved Tissue Culture Laboratory (TCL) for virus-free banana planting materials

The Quirino State University (QSU) has actively responded to solve the problem by conducting research on best management practices on how to reduce if not eradicate the BBTV, and with perseverance, finally produced quality banana planting materials that are virus-free through tissue culture.

QSU upgraded its TCL by refurbishing the laboratory with glass partitions and fixtures,

procuring additional laboratory equipment via small value procurements, and improving the tissue culture nursery facility with the construction of the stock room and hardening area or grow out nursery.

The said improvements were made through a project, titled Upgrading of Tissue Culture Facility Towards Efficient Production of High Value Crops, with funding support from the Agricultural Competitiveness Enhancement Fund (ACEF) through DA-BAR.

With the upgraded TCL, the university can produce up to

12,000 meriplants annually, with 50% increase in production, amounting to PhP 460,000 projected equivalent amount.

Supporting immediate recovery assistance

The improved TCL is also being used in another DA-BAR funded project, titled Technology Utilization and Commercialization of Tissue Cultured Banana in Quirino Province, in promoting and utilizing tissue-cultured banana planting materials to increase production and eventually augment income of banana farmers in the province of Quirino. The package of technologies being promoted include X-plant production, nursery management, field establishment, field management, and integrated pest management on saba and lakatan varieties.

The TCL will maintain a production of 10,000 healthy suckers or tissue cultured plantlets per cycle or every four months which will be distributed to banana farmer cooperators within the province. Technology transfer activities were done to enhance farmers' knowledge and skills on banana tissue culture production, pests and diseases management, and to continuously provide technical assistance to farmers regarding production.

"Through this project, we were able to help at least 35 banana farmers to eradicate the BBTv incidence in their farms and to adopt and practice the package of technology (POT) on tissue cultured banana through extensive information dissemination and trainings conducted by project staff," project leader, Elizabeth T. Carig said.

Two demonstration farms were established to showcase the POTs and served as sites for the farmer field schools of project participants. The San Manuel Agroforest Developers Association (SMAFDA), has 1,020 plantlets in their 6,000 sqm demonstration site, while the Victoria Agroforest Developers Association (VAFDA), has 844 pieces of tissue cultured bananas in 10,000 sqm.

Aside from the demonstration sites, two grow-out nurseries were also established for each partner people's organization (PO). Each grow out nursery can accommodate up to 3,000 potted tissue-cultured bananas.

"Considering the limited space and [workforce] of the University, project staff build the capacity of selected PO members through trainings and hands-on activities, particularly on the hardening process, so that they could help the project in the production aspect," Carig said.

The present arrangement is for QSU to produce meriplants then transfer to the partner POs who are in-charge with the hardening procedures before distributing to project beneficiaries.

"Hopefully, this will be turned into a livelihood enterprise for both the University and the two POs," Dr. Carig added.

Currently, the upgraded TCL is also being used in developing protocols for two more banana cultivars, turdan and Cavendish.

A project cooperator's experience

One of the beneficiaries is Norma Mangili, chairperson of VAFDA. in Brgy. Victoria, Aglipay, Quirino, where demonstration and nursery farms were established, shared her experience.

"Dati nagtatanim kami dito ng banana kaya lang ang mga pananim namin ay nagkasakit ng tungro hanggang sa wala na kaming makuhang bunga. Three years ago, isa ako sa napili ng QSU na maging cooperador na gumamit ng tissue cultured banana. Nag-training ako kung paano ito itanim, ano ang distansya ng bawat puno, gaano kalalim ang butas na pagtataniman, at kung paano mag-apply ng abono," she shared.

Rice hull, vermi compost, and basal were used as fertilizers in her farm— applying organic and inorganic fertilizer to each hole before planting the tissue cultured banana.

After applying fertilizer every month for up to six months results showed.

"Maliban sa malalaking bunga, sabay sabay din mamunga ang mga puno, at mas maganda ang piling ng mga saging. At dahil sabay-sabay mamunga, sabay sabay din naha-harvest at nabebenta kaya nakikita namin na malaki ang kikitain dahil bultuhan ang pagbenta," she added.

She acknowledged QSU and DA-BAR's support.

"Na-establish itong demonstration farm upang marami kaming mahikayat na katulad naming farmer na magtanim ng tissue cultured banana," Mangili ended.

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PRMSU's Research and Development Center boost agripreneurship in Zambales

Dr. JANICE M. BAYSA

Apart from rice, Zambales is noted for fostering promising large-scale production of mango fruits, vegetables, and root crops (eg, singkamas, kamote, and cassava). Farmers generally grow crops throughout the on-season or normal production schedule in this agricultural province that relies heavily on natural sources of irrigation and land resources. This almost always leads to an overabundance of commodities lowering commodity prices. Farmers struggle due to poor commodity prices and resort to adding value to their produce through processing.

With little means and experience, especially in value-adding their produce, finding hope amidst the economic difficulties of the marginal sector, particularly the farming communities of Zambales, looks unattainable. Farmers, particularly those who grow fruit and root crops, face low crop value during the postharvest period. However, many of these farmers continue to be encouraged to engage in postproduction processing in order to increase market value and get back on their feet.

The hope for the countryside

To boost economic stability and improve Zambaleño farmers'

and the region's livelihood and quality of life, President Ramon Magsaysay State University (PRMSU) is now bridging lives in the Zambales countryside. A one-of-a-kind fruit processing plant is funded through the Department of Agriculture's (DA) Agricultural Competitiveness Enhancement Fund (ACEF) program given in 2019. The PHP 5-M facility intends to strengthen PRMSU's Research and Development Center envisioned as the primary university technical support provider.

This initiative was materialized under the leadership of Dr. Roy N. Villalobos, Engr. Dinah Abugho, Dr. Janice Baysa and Ferdinand Domingo, PRMSU R&D leaders. Such an initiative is an intervention mechanism to alleviate poverty and provide nutritious food products to many.

Improved processing facility in Zambales

The center, which is now equipped with spray drier, water retort, vacuum fryer, planetary mixer, pasta maker, freeze drier, steam jacketed kettle, deck oven, continuous band sealer, and proofer, is now open for research, training, and internships in agriculture and related fields.

Furthermore, the R4D technologies created may aid in improving the quality of life of indigenous peoples (IPs) and Zambaleños as a whole, by linking production and marketing methods for a successful agripreneurial venture.

Technology and services for the people

The R4D Processing Center, as a research and learner-centered university, serves as a linkage mechanism for government organizations such as DA, local government units in various provinces, non-government organizations, people's organizations, and other state universities and colleges for the processing of IPs' and local farmers' crops.

Initially, the center provided fruit processing training to the Nueva Ecija Mango Growers Association, different fruit and vegetable associations in Zambales, some commercial sectors, and PRMSU students. The center currently processes items including processed cashew nuts, dried mango, mango puree, mango ice cream, mango wine, mango jelly, sweet potato and mango chips, and fried vacuum-fried mushroom chicharon, to mention a few.



PHOTOS COURTESY OF PRMSU

Envisioning agri-entrepreneurship for the people

To facilitate the marketing of quality and safe products from the various technology beneficiaries, the PRMSU has partnered with DA, People's Recovery, Empowerment and Development Assistance, and private organizations such as Jollibee Group Foundation and Green Thumb, among others. PRMSU is dedicated to bringing change to the lives of farmers, their families, and the community via the dedicated leadership of Dr. Villalobos and the technical team's competence.

The Zambales Provincial Government, led by Governor Hermogenes E. Ebdane Jr., fully supports the processing facility's presence at PRMSU, with targeted accreditation and implementation of the Department of Trade and Industry and Technical Education Skills Development Authority courses and training for mango



production and fruit and crop processing is expected to begin in the coming months. ◦

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SOFT-BONED SALMON

A SOFT-BONED TECHNOLOGY FOR

funded by the Agriculture Competitiveness Enhancement Fund

Step 1

Fish preparation

Remove the tail by cutting the sharp edges of the caudal fin for an easier wrapping (avoid damaging the aluminum foil). Pull out the internal organs and gills then wash until blood is not visible.

Making a slit along the ventral part will help for an easier removal of organs.



Step 2

Soaking in brine

Prepare a brine solution using the ratio of salt to water as follows:

- 1:4 (large size)
- 1:5 (medium size)
- 1:6 (small size)

Soak the fish in the brine for 120 minutes (large), 90 minutes (medium) and 60 minutes (small)



Step 3

Wrapping the fish

Drain the fish for 15-20 minutes to remove the water content. Wrap with an aluminum foil.

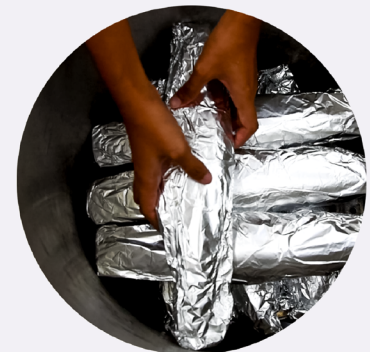


Step 4

Pressure cooking

Arrange the wrapped fish on trays and put in the pressure cooker. Pressure cook the fish at 15PSI: 150 minutes (large), 120 minutes (medium) and 90 minutes (small).

Pressure cooker must be properly closed.



SMOKED MILKFISH OR MILKFISH PROCESSED PRODUCTS

through the Department of Agriculture-Bureau of Agricultural Research



Step 8

Storing

Place the product in a cool place.
*At room temperature of 28°C,
the product may last up to three
months, six to nine months when
stored in chiller, and one to two years
when stored in freezer.*



Step 7

Cooling and packing

Remove the fish from the smoke
drum and let it cool.
Put the fish in a sloping position
to remove excess moisture then
pack the product.

*Vacuum packing is advised to remove all
the excess air inside the package and
extend the product's shelf life.*



Step 6

Smoking

Prepare the smoking drum.
Put around 1/8 sack of hardwood
sawdust and make a smoke.
Subject fish to smoke deposition
for 40-60 minutes or until the
desired color is attained.



Step 5

Unwrapping and drying

Haul the fish from the pressure
cooker then remove the wrapping
and sun dry for 30-45 minutes to
remove the excess moisture.



SO FAR, SOY GOOD

Reyner Joshua B. Valentin

Move over, Taho -- the new soya kids are on the block and about to make some noise and satisfy your soya cravings.

The project Upscaling the Promotion and Commercialization of Soya products in the province of Quirino executed by Quirino State University and funded by the Agricultural Competitiveness Enhancement Fund (ACEF) through DA-BAR developed and promoted various soya products intended to upscale and to effectively market its soya products to interested parties.

As of now, the following soya food products that were extended to multiple parties within Quirino province are pan de soya, soya butterscotch, soya nuggets, soya banana loaf, and soya loaf.

All the soya products that were developed have not only been deemed soy delicious, but also financially viable.

Interested on any of these products? Allow me to show you the financial viability of each should you decide to invest.



SOYA PANDESAL

Selling price	2
Annual sales volume	792,000
Average annual net income	180,000
Investment cost	216,000
Return on investment	83.33%



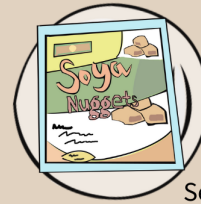
SOYA BUTTERSCOTCH

Selling price	110
Annual sales volume	26,400
Average annual net income	20,571.36
Investment cost	5,828.64
Return on investment	77%



SOYA BANANA LOAF

Selling price	120
Annual sales volume	115,200
Average annual net income	25,900
Investment cost	89,280
Return on investment	29%



SOYA NUGGETS

Selling price	100
Annual sales volume	10,500
Average annual net income	3,150
Investment cost	7,350
Return on investment	42%



SOYA LOAF

Selling price	35
Annual sales volume	140,000
Average annual net income	60,000
Investment cost	80,000
Return on investment	75%

*In Philippine Peso (Php)

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What a Taro-iffic Financial Feasibility

Reyner Joshua B. Valentin

This is not taro in *sinigang*, nor taro in *laing*, this is taro in its own glorious form that is enhanced and marketed by Ifugao State University with the support and funding of the Department of Agriculture's (DA) - Agricultural Competitiveness Enhancement Fund (ACEF) through the DA-Bureau of Agricultural Research.

So, the next time you look for snacks to nib on and are tired of the usual potato chips, how about give this local taro chip a try. Deep fried and perfectly salted for snack time while watching your favorite shows and movies. Who knows, it might become your new favorite.

Does this product pique your interest? Let me show you its financial viability.

Market Outlets

Health 101 Restoerant – Magsaysay, Baguio City
 St. John Display Center – Lamut, Ifugao
 E-Care shop – Diliman, Quezon City
 Cathedral of the Resurrection – Baguio City
 Mila's Bakeshop – Lagawe, Ifugao
 J-Law Gen. Merchandise – Lagawe, Ifugao
 JM Farm & Restaurant – Lamut, Ifugao
 Kalye Tapas - Lamut, Ifugao
 Thumbs-Up Diner – Lamut, Ifugao
 Gongob's Store – Lamut, Ifugao
 IFSU Winery Marketing and Display Center - Lamut, Ifugao

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Item	Amount (PhP)
Production volume	60 kg/weekly
Selling price	330/kg
Annual sales volume	18,000 kgs/annum
Average annual net income	469,460
Investment cost	709,450
Return on investment	71.7%

Revenue streams (monthly sales)

50 grams (1,158 x PhP 20)	23,160
100 grams (138 x PhP 40)	5,520
Total	28,680

Cost Structure (monthly)

Raw Materials

Taro corms (240 kg x PhP 35)	8,400
Calamansi (24 kg x PhP 40)	960
Sugar (5 kg x PhP 55)	275
Cooking oil (6 kg x PhP 80)	480
Salt	5
Plastic Pouch	2,592
Label	1,296
Gasul	650
Subtotal	14,658

Others

Labor (120 x 20 pax)	3,000
Share (church)	250
Water	250
Electricity	250
Maintenance	100
ECW savings	400
Subtotal	4,250
Grand Total	18,908



After each harvest, the members were capacitated in the *tilapia* filleting activities. As a result, they could produce vacuum packed Daerrys Tilapia Fillet that will be supplied to manufacture the Daerrys Tilapia Ice Cream and Tilapia Cookies.

READ FULL STORY ON PAGE 18



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