



Eleazar keynotes 1st Makan Festival; PGR Center inaugurated



Facade of the PGR Center

PHOTOS BY: RDELACRUZ

Dr. Eleazar (2nd from left) leads the inauguration of the PGR center.

The Department of Agriculture-Cagayan Valley Research Center (DA-CVRC) conducted the Panagdadapun cum First Cagayan Valley Makan Festival on 16-17 May 2018 in Ilagan, Isabela. Gracing the opening of the festival was Dr. Nicomedes P. Eleazar, director of the Bureau of Agricultural Research (BAR), who served as the keynote speaker of the festival.

“Makan” is an Ilocano word for “food” which carries what the event is all about, celebrating Cagayan Valley’s culture through food and festivity. Showcased in the festival were food exhibition, *bigasan ng masa*, integrated demonstration plots on edible landscaping, hydroponics and aquaponics, mushroom culture, and organic farming — all of which were results and products of research developed by the CVRC.

In 2016, the Department of Tourism (DOT) 2 declared CVRC as an agri-ecotourism farm destination in Region 2, making it Ilagan’s third tourist spots, along with the Ilagan Sanctuary and the Japanese War Tunnel. CVRC is the first accredited

agro-ecotourism farm in the region due to its promotion of organic farming, presence of *pasalubong* center, and other amenities where tourists can appreciate the area.

One of the highlights of the festival was the launching of the Plant Genetic Resources (PGR) Center, a first-of-a-kind genebank facility in Luzon that houses a variety of collections of major and high-value crops for future source of genetic materials for crop improvement undertakings.

According to Dr. Eleazar, the facility, which was funded by BAR through its Institutional Development Grant (IDG), is a result of a collaboration with the Asian Food and Agriculture Cooperation Initiative (AFACI) of the Korea’s Rural Development Administration. “We sent researchers from regions, 2, 4A, and 5 for trainings on plant genetic resources. In support to that, we funded the establishment of a PGR Center to ensure the sustainability of such undertaking,” the bureau chief explained.

Dir. Eleazar reiterated the

need for judicious use of resources mentioning that, “funding research initiatives must go hand-in-hand with supporting state-of-the-art research facilities.” He further said that the PGR Center will serve as a “mini IRRI genebank facility” but it will focus not only on rice. “Included in this genebank are the 2,000 collections of native corn varieties out of the Corn Germplasm Utilization through Advance Research and Development (CGUARD), an initiative, also funded by BAR,” Dir. Eleazar added. ### (Rita T. dela Cruz)

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RM Mtg underscores strengthening RRDEN



BAR Director Nicomedes P. Eleazar with the participants of the second Research Management (RM) Meeting at the Cagayan Valley Research Center in Ilagan, Isabela. PHOTOS BY RDELACRUZ

To fast track the implementation, adoption, and expansion of agriculture and fishery undertakings through research and development (R&D), the 2nd Research Management (RM) meeting focused on strengthening the Regional Research and Development and Extension Network (RRDEN).

“It’s about time that we fine tune the guidelines and policies related to the RRDEN to strengthen our partnership and regional cooperation in the conduct of agriculture and fisheries RDE,” emphasized BAR Director Nicomedes P. Eleazar in his opening message.

RRDEN is an existing network of regional and provincial collaborators that is intended to strengthen the RDE priority setting and implementation of programs on the agriculture and

fishery sector, in lieu with the current goals of the national government.

BAR, as the national coordinating agency for agriculture and fishery R&D of the Department of Agriculture (DA), hopes to establish a closer and stronger regional integration while narrowing development gaps among its RDE partners. For BAR, this can be fully accomplished by establishing defined and systematic strategies of the network.

The RM meeting was held at the Cagayan Valley Research Center (CVRC) in Ilagan, Isabela on 17 May 2018. Having gathered more than a hundred attendees from different DA Regional Field Offices (RFOs), this quarter’s meeting drew the largest number of participants so far, composed of the regional

technical directors; research managers and staff; Bureau of Fisheries and Aquatic Resources (BFAR) regional field offices’ assistant directors and research division chiefs and staff; and members from the DA staff bureaus and attached agencies.

Also included in the agenda were the updates on the conduct of the 2018 Agriculture and Fisheries Technology Forum and Product Exhibition, Global Innovation Policy Accelerator Programme (GIPA); and the Information and Knowledge Management (IKM) Mentorship Program.

Dr. Mudjekeewis Santos of BFAR-National Fisheries Research and Development Institute (NFRDI) presented the updates and guidelines on the Scientific Career System (SCS) to orient the participants on

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Reg. 2 R&D centers for organic agriculture, mushroom inaugurated



Two new research facilities of DA-RFO 2 funded by the Bureau of Agricultural Research (BAR) are inaugurated: Organic Agriculture Research (OA) Research and Development (R&D) Center (right), and the Mushroom R&D Center (left).

PHOTOS BY RDELACRUZ

Two research centers were inaugurated at the Department of Agriculture-Regional Field Office (DA-RFO) 2: the Organic Agriculture Research (OA) Research and Development (R&D) Center on 15 May 2018 at the Nueva Vizcaya Experiment Station (NVES) in Bagabag, Nueva Vizcaya; and the Mushroom R&D Center on 16 March 2018 at the Regional Crop Protection Center (RCPC) in Ilagan, Isabela.

Leading the inauguration ceremonies were BAR Director Nicomedes P. Eleazar and DA-RFO 2 Regional Executive Director Lorenzo M. Caranguian. Joining them were Ms. Digna Sandoval, BAR-Institutional Development Division (IDD) head; and Ms. Rose Mary Aquino, DA-RFO 2 regional technical director.

The OA R&D Center was established as a one-stop-shop research center to enhance, develop, and promote package of technologies on organic agriculture practices thereby ensuring a sustainable food and safe environment in the region.

Meanwhile, to support the research activities on sustainable and competitive mushroom production towards food security and safety in Cagayan Valley, the Mushroom R&D Center was established to continuously support and sustain the availability of mushroom pure

culture and spawn to mushroom stakeholders. Among the services that the Center offers include providing hands-on training on mushroom and spawn production; and availing of grain spawn for initial fruiting bag production.

RTD Rose Mary Aquino welcomed everyone to the event. She expressed her thanks to BAR for funding research facilities that will truly help the sector. She also acknowledged all the research manpower of DA-RFO 2 for actively preparing not just "fundable but quality" research proposals that will benefit the farmers and the agriculture sector.

Meanwhile, Dr. Eleazar emphasized in his message that all research facilities provided by BAR, through the Institutional Development Grant (IDG) program must be functional and that specific package of technologies must be readily available for the stakeholders and clients. "We don't just support research, we also need to capacitate our researchers by providing them state-of-the-art facilities that will enable them to deliver the outputs," he reiterated.

IDG is one of the programs of BAR that strengthens the R&D capabilities of the National Research and Development System for Agriculture and Fisheries (NaRDSAF) member-institutions by

providing funding support for the acquisition of modern laboratory equipment and for the construction and renovation of research facilities. ### (Rita T. dela Cruz)

2nd RM Meeting...from page 2

the various aspects of the system including advancement based on qualifications, merit, and scientific productivity. SCS is a system of recruitment, career progression, recognition and reward of scientists in the public service, as a means of developing a pool of highly-qualified and productive scientific personnel.

Likewise, DA-RFO 2 Regional Technical Director Rose Mary Aquino shared the region's product development framework, being the region's success formula in its agripreneurship advocacy. a

Part of the activity were study visits at different R&D facilities of DA-RFO 2 including the Cagayan Valley Integrated Agricultural Laboratory (CVIAL), the first integrated, state-of-the-art, one-stop-shop diagnostic facility in the country, and other research stations in Tuguegarao, Solana, and Isabela. The group also participated in the "First Makan Festival" organized by DA-CVRC, wherein they were also toured around the center's DOT-accredited agro-ecotourism site. ### (Daryl Lou A. Battad)

SUPPORT TO PHL NATIVE ANIMALS INTENSIFIED

The Bureau of Agricultural Research (BAR), in partnership with the Bureau of Animal Industry- National Swine and Poultry Research and Development Center (BAI-NSPRDC), intensifies its research and development (R&D) to develop technologies that will address conservation, characterization, and commercialization of potential strains of native animals, through product development and promotion.

BAR has been supporting the development of production and management technologies and product development of native animals including pig, chicken, and cattle. As one of the key agencies that coordinate and provide support to native animals R&D in the country, BAR has supported 25 projects since 2008.

These projects were implemented by the BAI-Animal Products and Development Center and NSPRDC; DA-Regional Field Offices 4A, and 5; state universities and colleges including University of the Philippines Los Baños, University of Rizal System, Southern Luzon State University-Judge Guillermo Eleazar, and; municipal local government unit of Tagkawayan, Quezon; and civic organizations in the country.

The technologies generated specifically cover: 1) production and



management (housing and feeding management); 2) breed conservation and utilization; 3) processing into different food products; 4) value chain analysis; and 5) information system.

To intensify policies and initiatives for sustainable

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BAR leads writeshop on RRDEN operations manual

To ensure the smooth and effective delivery of research and development, and extension (RDE) while strengthening the cooperation among the regional networks, the Bureau of Agricultural Research (BAR) spearheaded the crafting of the operations manual of the Regional Research and Development and Extension Network (RRDEN) on 30 May - 1 June 2018.

RRDEN is an existing network of regional and provincial collaborators in the undertaking of regional RDE programs. Further, it is intended to strengthen the RDE priority setting and implementation of programs on the agriculture and fishery sector.

Along with the intensification of agri-fishery RDE, BAR, through RRDEN ensures the complementation of RDE programs and activities among R&D institutions, effectively promoting information and

technologies to end-users especially to the farmers and fisherfolk.

Pursuant to the Agriculture and Fisheries Modernization Act (AFMA) under Rule 81.14.3, RRDEN was created for each region through the Department of Agriculture-Regional Field Offices (DA-RFOs), under BAR's guidance and supervision.

The three-day activity, led by the bureau's Program Monitoring and Evaluation Division (PMED), aimed to review, improve, and update the implementing guidelines of RRDEN in line with the programs and priorities of DA.

"We have to have a standardized protocol that will govern the network, allowing an effective way of communicating policy and procedures encompassing the network," Salvacion Ritual, chief of PMED said.

Mandated to coordinate and oversee the network, BAR key officials, program focals, and



PMED Chief, Ms. Salvacion Ritual discusses the proposed organizational structure of RRDEN. PHOTO BY DBATTAD

technical staff participated in devising and crafting the RRDEN operations manual which is set to be published and launched this year. ### (Daryl Lou A. Battad)

Support to Phl...from page 4

conservation, production, and marketing of native animals, the Department of Agriculture institutionalized the Philippine Native Animal Development (PNAD) program in 2010.

Under this program, one successful BAR-funded project was the “Agricultural Systems Approach to Commercialization of Native Swine in Quezon” implemented by University of the Philippines Los Baños Foundation, Inc. (UPLBFI). The project promoted the use of *Gabing San Fernando* (*Xanthosoma sagittifolium*), *Trichanthera*, common herbal plants, including *kangkong*, *kamote* as feed for native pigs. Through the “Dos Por Cinco”, a native swine module, a farmer can generate an additional Php 33,500 in two years from selling piglets.

The use of *Sakwa* as feed to native pigs lessened the expenses of inputs. Farmers can have an estimated income of Php 50,000 in a year from

the selling of piglets for lechon.

Members of the Rural Improvement Club of Bondoc Peninsula in Quezon, the farmer cooperators, found the project helpful and relevant in their existing farming system. They are planting herbs (use for treating common swine diseases) and forages under their coconut plantations. Farmer cooperators were able to increase their income convincing other farmers in the area to be part of the project. In fact, the number of farmer partners increased from 12 to 44 in two years.

Another UPLB project under the PNAD program was the commercialization of Bohol native chicken production in the community level and re-educating primary students and parents in the patrimonial and economic value of science-based native chicken production.

On native cattle, one project was on “Commercialization

of Philippine Native Cattle for Optimum Production of Siquijor Beef” that led to a partnership with the Catulayan Community Multi-Purpose Cooperative (CCMPC) that now served as farmer-cooperators of the project. The project aimed to: 1) quantitatively describe the socio-demographic profile of native cattle raisers; 2) develop native beef grading standard; 3) develop native beef cuts; and 4) develop native beef products and by-products. The Provincial Veterinary Office of Siquijor conducted partial survey on the supply and demand of beef in the province. Based on the findings on a weekly basis, the province needs 567 kilograms of beef. This figure may be attributed to the demand of the foreigners visiting the province. The project will be developing beef floss and other possible products from the native cattle of Siquijor. ### (Ma. Eloisa H. Aquino)

HVCDP and AFMA projects reviewed

The Bureau of Agricultural Research (BAR), through the Program Monitoring and Evaluation Division (PMED), held a project reviewed five on-going and two completed BAR-funded and assisted projects under the High-Value Crops Development

Program (HVCDP) and the Agriculture and Fisheries Modernization Act (AFMA) on 3 May 2018 at BAR, Quezon City.

The review aimed to ensure the smooth progress of on-going projects in line with the prescribed timelines, logical frameworks, and expected outputs; and assess further projects that are nearing their completion.

Among the on-going projects that were reviewed included the evaluation

and sustainability assessment of strategic production areas for cacao and coffee; study on the combined influence of genotype, fermentation method, and roasting premium cacao products; minimizing food security safety hazards in selected vegetables thru postharvest handling systems improvement; and monitoring and dietary risk assessment of pesticide residues in beverages.

The projects about to be

completed were the characterization of Philippine coffee varieties, and evaluation of chitin-containing indigenous materials for the control of *Phytophthora* disease of Jackfruit.

Dr. Edralina Serrano and Dr. Rodel Maghirang both from the University of the Philippines Los Baños, and Dr. Andrea Agillon of BAR served as project evaluators during the review. ### (Patrick Raymund A. Lesaca)



(Left to Right) Evaluators, Dr. Rodel Maghirang, Dr. Andrea Agillon, and Dr. Edralina Serrano.

PHOTO BY PRLESACA

BAR leads nat'l review for soybean projects



Participants composing of regional soybean focal persons and project implementers present during the National Review for Soybean Projects.

PHOTO BY LFONTANIL

To assess the implementation and determine the progress of the supported soybean projects and research and development (R&D) activities under the Department of Agriculture (DA) National Soybean Program, the Bureau of Agricultural Research (BAR), in partnership with the High Value Crops Development Program (HVCDP), held the “National Review and Planning Workshop on Soybean R&D Projects” on May 15-18, 2018 in Ilagan, Isabela.

The activity is part of the continuing effort of BAR, as the focal agency for Soybean R&D of DA, to promote the production, processing, utilization, and marketing of soybean in the country.

In attendance were BAR Director Nicomedes P. Eleazar, DA-RFO 2 Regional Executive Director Lorenzo M. Caranguian, and DA-RFO 2 Regional Technical Director for Research and Regulations Rose Mary G. Aquino. Joining them were Mr. Anthony Obligado, chief of BAR-Technology Commercialization Division; Mr. Elmer Enicola, vice chair of the Soybean Technical Working Group (TWG); along with regional soybean focal persons; project implementers from state universities and colleges (SUCs), and BAR staff.

Part of the activity was to present updates and accomplishments of each



(L-R) DA-RFO 2 Regional Executive Dir. Lorenzo Caranguian, BAR Director Nicomedes Eleazar, and DA-RFO 2 Regional Technical Director Rose Mary Aquino during the opening ceremony of the soybean national review at CVRC.

PHOTOS BY LFONTANIL

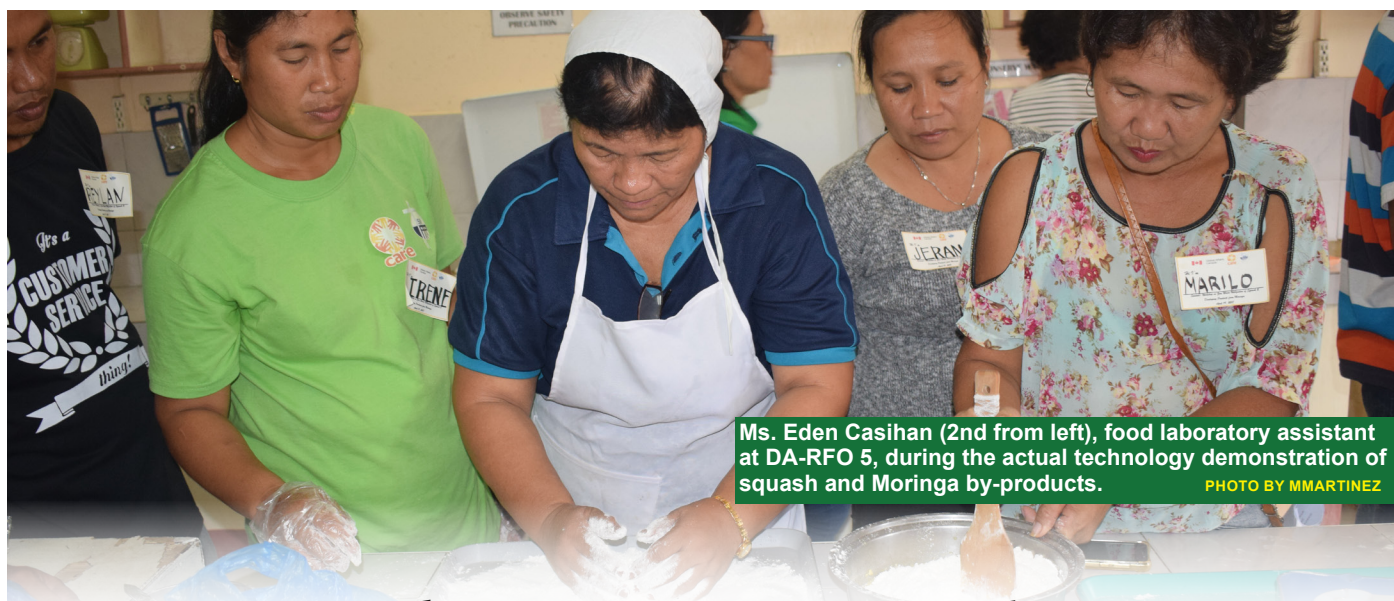
project by reporting the results of technology demonstrations, yield and income derived from farm sites, and newly developed technologies on soybean processing. Also discussed were prior activities during the implementation process to better assess the milestones and impacts to beneficiaries, as well as to address other issues and concerns.

Participants also visited the DA-RFO 2 Cagayan Valley Research Center (CVRC) Food Product Research and Development Center. Another highlight of the meeting was the presentations of plans for 2018-2019 DA-Soybean Program.

BAR Director Eleazar in his message, encouraged project implementers to continuously intensify the expansion areas for soybean production, and strengthen the promotion of technologies developed in tight coordination with

the private sector. He instructed the group to include in the planning workshop the preparation of socio-economic studies and value chain analysis (VCA) that will be useful as strategy tool on analyzing prior activities that already conducted in the Soybean Program, likewise, to remind the project implementers to set plans for other R&D interventions for soybean.

Mr. Enicola presented the “Soybean Development Program Support Project for 2017”, updates on the local soybean industry, and discussed the Philippine annual whole soybean utilization and its market situation. He also reported that the assistance of the program to potential non-soyfood value chains to enhance the availability of soybean as raw material and consequently, utilization of soyfoods. ### (Leoveliza C. Fontanil)



Ms. Eden Casihan (2nd from left), food laboratory assistant at DA-RFO 5, during the actual technology demonstration of squash and Moringa by-products. PHOTO BY MMARTINEZ

BAR conducts regional seminar on squash and Moringa in Iloilo

The Bureau of Agricultural Research (BAR), through the Applied Communication Division (ACD), in partnership with the Asian Food and Agriculture Cooperative Initiative (AFACI) and CARE Philippines, held a seminar on

resource speakers, and participants. In her message, she mentioned that the seminars conducted in the region were part of the bureau's continuing effort to bring significant technologies generated from the various R&D initiatives supported by BAR.

5 (DA-RFO 5). She discussed the agribusiness potential on the product development of *malungay* leaf powder as good potential sources of food fortificant, functional drinks, food supplement, and animal feed ingredients.

On the other hand, Ms. Eden Casihan, food laboratory assistant, DA-RFO 5, discussed the "Zero-Waste Utilization of Squash." Her discussion focused on zero-waste use of squash, which means creating and managing products and processes to avoid and if not, eliminate the volume of waste materials due to postharvest losses.

To further appreciate the developed squash and Moringa recipes by BIARC, the resource speakers conducted actual technology demonstration of sample products (squash doughnuts, squash *leche flan*, squash pickles, squash *halaya*, squash ice cream *malunggay polvoron* and *malunggay* juice).

Various information, education and communication (IEC) materials including crop calendars; kits on crop production; and technology videos on mushroom and tilapia; and soybean recipes were also distributed to the attendees. This initiative is in collaboration with AFACI. ### (Leoveliza C. Fontanil)



Farmer-participants of BAR regional seminar on Zero Waste Utilization of Squash and Developing Products from Moringa. PHOTO BY MMARTINEZ

"Zero Waste Utilization of Squash and Developing Products from Moringa" at the Northern Iloilo Polytechnic State College (NIPSC) in Poblacion South East, Lemery, Iloilo.

The activity, which was part of the BAR Regional Seminar Series, was attended by farmers from the most vulnerable and excluded communities affected by the 2013 Typhoon Yolanda.

Ms. Julia A. Lapitan, head of BAR-ACD, welcomed the guests,

Likewise, she emphasized that this kind of activity is one of the many outlets in which new technologies and interventions on farming and processing are being brought to the public for potential livelihood opportunity.

Presenting the "Food Products from Malungay (*Moringa oleifera*)" was Ms. Luz Marcelino of the Bicol Integrated Agricultural Research Center (BIARC) Department of Agriculture -Regional Field Office

2018 AgriTalk draws crowd in Iloilo



(inset) Representatives from BAR and ATI award certificates of appreciation to AgriTalk Iloilo speakers, Mr. Zac Sarian (left), editor of Manila Bulletin's Agriculture Magazine; and Ms. Annelyn Hapitan, senior science research specialist of DA-RFO 6.

PHOTOS BY RDELACRUZ

More than 500 individuals composing of farmers, students, and farming enthusiasts attended the 2018 AgriTalk Free Seminars on 12 May 2018 at Cyberzone, SM City Iloilo.

AgriTalk was organized by the Manila Bulletin, in collaboration with the Department of Agriculture's Agricultural Training Institute (ATI), Bureau of Agricultural Research (BAR), and Regional Field Office (RFO) 6.

Participants and attendees were welcomed by Dr. Peter Sobrevega, regional technical director for research and regulation, DA-RFO; and Mr. Zac Sarian, veteran agriculture journalist and editor-in-chief of Manila Bulletin's Agriculture

Magazine.

Among the topics discussed during the one-day seminar were: 1) "Making Organic Concoctions" presented by Ms. Glenda Himatay, regional organic agriculture focal person, DA-RFO 6; 2) "Square Foot Gardening" discussed by Mr. Honorio Cervantes, farmer-partner, ATI; 3) "Mushroom Production" presented by Mr. Glenn Mariano, mushroom project coordinator, DA-RFO 6, and Mr. Eden Panisales, project-in-charge of on-station mushroom production, DA-RFO 6; 4) "Goat Production" discussed by Ms. Anelyn Hapitan, chief of livestock research section, DA-RFO 6, and Mr. Cyson Altis, science research specialist, DA-RFO 6; and 5) "Herbs and Spices

Production" by Ms. Rowena Carpio Bienes of the Allied Botanical. Mr. Zac Sarian of the Manila Bulletin also presented a special topic titled "Successful Farmers and their Bright Ideas".

AgriTalk is a free seminar featuring the latest and practical technologies and trends in agriculture. Specifically, it aims to showcase technologies and farming practices that farmers can adopt in their own farms for increased production and income. The AgriTalk held in Iloilo was the first of the technology forum series for 2018. The next seminar series will be held in Nueva Ecija for Luzon; and in Davao for Mindanao.

(Rita T. dela Cruz)

BAR holds seminar on bees

Around 80 participants attended the seminar of the Bureau of Agricultural Research (BAR) held on 24 May, 2008 at the BAR Annex, Visayas Ave., Diliman, Quezon City. The seminar, facilitated by the bureau's Applied Communication Division, featured native species of bees and the utilization and commercialization of stingless bee by-products.

Dr. Amalia E. Almazol, professor and college dean of the Southern Luzon State University in Lucban,

Quezon, served as the first resource speaker. Her presentation, titled "Diversity of Native Species of Bees in Mt. Banahaw-San Cristobal Protected Landscape," focused on the different native species of bees and bee nests that Almazol's team discovered in Mt. Banahaw-San Cristobal Protected Landscape (MBSCPL). This study was funded by BAR.

The native bees found in MBSCPL were determined and assessed while the distribution of bee

nests was located through survey and Geographical Information System (GIS) mapping.

The second resource speaker was from the Central Bicol State University of Agriculture and leads four research projects which are all BAR-funded. Dr. Maria Dulce J. Mostoles led a presentation titled, "Utilization and Commercial Production of Stingless Bees and its Products in the Bicol Region" which featured the importance of stingless bees or the meliponines. According to

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Secrets to raising Iloilo's best chicken

by Ephraim John J. Gestupa

No visit to Iloilo City would be complete without feasting on the locality's culinary treasures. From the freshest seafood to the most flavorful bowl of *batchoy*, Iloilo is best experienced as a gastronomic adventure. Among the delicacies the city is known for are its native chicken dishes. Upon landing at the airport in the municipality in Cabatuan, tourists detour to the town market for *tinu-om*, an herbed chicken soup dish, sealed and cooked inside banana leaves.

On the other side of the city, in the coastal stretch of Villa, locals, tourists and even high-profile politicians regularly come together

in the restaurants for a comforting dish of roasted native chicken with a generous side of scallops. Most if not all of the poultry dishes cooked in local restaurants across Iloilo get their chicken ingredient from local native chicken growers.

For the local farmers in Western Visayas, the taste of native chicken is unlike any other. Seeing the clear potential and steady demand for native chicken in the region, the Department of Agriculture-Regional Field Office (DA-RFO) 6 conducted various research activities and collaborations with state universities and colleges aimed at improvement

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The secret to the success of the restaurants lined up along villa beach is the unique and flavorful meat of native chicken raised locally. Most restaurant owners in Ilo-ilo city buy their chicken stocks directly from the farmers.

PHOTO BY EGESTUPA



Dr. Amalia E. Almazol (right) of the Southern Luzon State University in Lucban, Quezon and Dr. Maria Dulce J. Mostoles (left) of the Central Bicol State University of Agriculture serve as resource speakers during the BAR's monthly in-house seminars on beekeeping.

PHOTOS BY RHERMOSO

BAR holds seminar...from page 8

Mostoles, "Upscaling meliponiculture can increase income through utilization and commercial production of the stingless bee and its products through sustained production with abundant colonies and pollen sources, enhanced pollination and health and wellness products."

When asked about bee conservation, Mostoles stated that she made a policy to train the hunters on how to hunt and how to prevent exploiting the environment. She stated that the policy was created when the stingless bee industry started to emerge and she noticed that the

hunters kept on forging the feral colonies without trying to regrow them. Mostoles, together with her team, tried to create different products from stingless bees. The food and cosmetic products from stingless bees came from its utilized raw materials such as pollen, propolis and honey which will then be mixed in other products like food such as polvoron with pollen, macaroons with honey and honey propolis candies, and skin care products such as moisturizing cream, propolis spray, hand sanitizer, bath soap and shampoo bar. They also created a propolis hand sanitizer

and throat spray, and bees wax is also used as a commercialized stingless bee product.

With the fast-emerging industry of stingless bees in the Bicol region, sustainability and stability is important. Bicol region may have a good population distribution of stingless bees in the wild, but meliponiculturists should still search for ways on how they can properly farm and culture these meliponines without exploiting the environment and the stingless bees in the wild.

The continuous progress and improvement of the stingless bee industry in the Bicol region could not only help the environment and the bee colonies itself but it could also help the communities by obtaining new means of livelihood, higher rates of employment, health and wellness promotion and provide a better value crop production in the agricultural lands through pollination.

BAR also provided and distributed free education, information and communication materials featuring BAR-supported agricultural and fisheries technologies which was funded and supported by the Asian Food and Agriculture Cooperation Initiative (AFACI). ### (Alexandrea D. Suñga)

Beyond CPAR: Organic farmer continues to expand horizons

He asked the right questions at the most opportune time. Now, Mr. Villafuerte S. Camat, Jr. has gone a long way after successfully adopting the technologies and interventions introduced to him through a Community-based Participatory Action Research (CPAR) project.

Almost a decade ago, Camat sought the assistance of Mr. Arthur Fontanilla, an agriculture technician at Lamut Municipal Agriculture Office, to help him transition his then integrated conventional farm into an organic one. Fontanilla, at that time, was involved in the implementation of “CPAR on Fishpond Tilapia Production and Processing Project in Hapid and Sanafe, Lamut, Ifugao.” Fontanilla, invited Camat to attend the capacity building training, field trips, and other activities on fishpond production provided through the project as well as the other on-going sessions of farmer’s field school on organic vegetable and chicken production at that time. With these, Camat was able to acquire knowledge and hands-on training on integrated organic production which he applied on his farm. Through this, Camat was able to develop his own feed formulation for his swine, chicken, and fish. He was also able to produce his own fertilizer using Azolla in combination with the manure from his organic swine. In 2013, Camat was able to fully transition his farm into an integrated organic farm. After his successful adoption of that CPAR project, Camat continued to step up his game.

On 23-27 April 2018, a team from the Bureau of Agricultural Research (BAR) conducted a monitoring activity on the completed CPAR projects in Ifugao to see if the projects were sustained after its implementation. It was



Mr. Villafuerte Camat explains to his students the process of making different organic concoctions. PHOTO BY RHERMOSO

during this visit that Dr. Catherine V. Buenaventura, supervising agriculturist at the Provincial Agriculture Environment and Natural Resources Office and CPAR project coordinator in Ifugao, proudly updated the monitoring team from BAR on the recent milestone in Camat’s organic farm. His farm has been certified as a farm school by the Technical Skills and Development Authority-Cordillera Administrative Region (TESDA-CAR). With this, Camat is now qualified to teach the following modules on organic agriculture: 1) Produce Organic Concoction and Extract Leading to Organic Agriculture Production NC II; 2) Produce Organic Fertilizer Leading to Organic Agriculture NC II; 3) Produce Organic Vegetables Leading to Organic Agriculture NC II; 4) Raise Organic Hogs Leading to Organic Agriculture NC II; and, 5) Raise Organic Chicken Leading to Organic Agriculture NC II. These modules are registered with TESDA under the Unified Technical Vocational Education and Training Program Registration and Accreditation System.

What’s unique with Camat’s farm school is that he provides his students with training kits (i.e. basic supplies, uniform, etc.) meals and snacks. According to him, providing the participants with food is not actually part of his arrangement with TESDA. In fact, he is the only one who does this among the other farm

schools accredited by TESDA in the area. Despite incurring additional expenses, Camat thought it would be best to provide his students with food. By giving them meals and snacks, his students would no longer have to go out of the farm school to buy which helps in efficiently maximizing their time.

Camat was able to purchase second-hand SUV and additional tools and equipment for his farm using income from his organic farm as well as his earnings from teaching TESDA-registered modules on organic farming. Now, he is planning to reestablish his fishpond with high hopes that he could also apply it for accreditation under TESDA.

Before his farm was certified as a farm school by TESDA-CAR, it was first accredited as a School for Practical Agriculture on Organic Agriculture by the Agricultural Training Institute (ATI)-CAR. Following CPAR’s initiative to build linkages that could generate more opportunities for the farmers, Dr. Buenaventura endorsed Camat’s integrated organic farm to ATI-CAR. From there, ATI-CAR has successfully linked his farm to TESDA.

His endeavors on organic farming have won him the 2017 Outstanding Small Farmer (Individual) and the 2015 Outstanding Organic Farming Family during CAR’s Regional Organic Agriculture Achievers’ Awards. ###

Fighting disease the natural way with yeast

by Ephraim John J. Gestupa

In his 2010 TedTalk in Tela-viv, Israel, entomologist Shimon Steinberg reiterated the battle cry of his life's work as a scientist studying biological pest control: "give nature a chance."

The environment where we practice agriculture has been greatly compromised by the use of chemical inputs such as pesticide and such practice has also lead to what growers dread to be as developed resistance of the pests to chemical control.

Steinberg pointed out the need to reverse these unhelpful agricultural practices by investing on biological control as the means to restore balance to the agricultural plot.

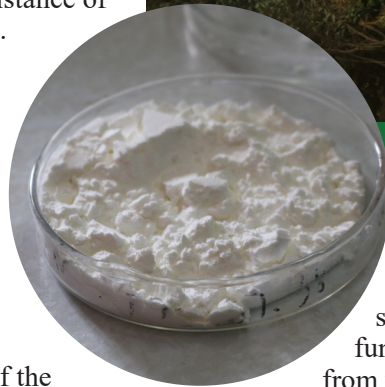
In the Philippines, the National Institute of Microbiology and Biotechnology- University of the Philippines Los Baños (BIOTECH-UPLB) has been a key player in rearing and supporting local farmers towards practicing biological pest control, more popularly known among their farmer partners as a form of organic agriculture.

Dr. Mannix Pedro is among the scientists who are conducting research on non-chemical solutions to ensure the quality of harvested, high-value vegetables and fruit crops.

"Nakita namin yung pag-gamit ng mga chemicals na halos lahat ng high-value crops ay very high ang spray. Minabuti namin na humanap ng natural na paraan para sa ganun man ay hindi maperwisyo ang ating kalusugan sa pag-consume ng fruits and vegetables."

Dr. Pedro and his colleagues believe that nature has a way of healing itself and so they looked into how they can make use of yeast to lessen the damage caused by microorganisms in harvested fruits and vegetables like mango, banana, bell pepper and eggplant.

While most people know of yeast as a baking ingredient added to



Organic pest control yeast in the form of a powder-like substance (pictured left) to be mixed with water and sprayed on high-value crops (pictured above).
PHOTOS BY EGestupa

dough for it to expand, yeast, in essence, is single-celled fungi which aside from what is used in baking, have other strains that can serve as antagonists that fight disease causing microorganisms in agricultural crops.

After reviewing research done in other countries on the use of yeast as biocontrol, Dr. Pedro and his colleagues set out to test the method among the most commonly exported crops from the Philippines. This was made possible through a project titled, "Yeast as Biocontrol Agent for Postharvest Diseases for High Value Vegetables and Fruit Crops" that was funded by the Bureau of Agricultural Research.

Dr. Pedro would sample out the yeast species residing in mango as well as disease causing microorganisms present in the high-value crop sample. Through in vitro lab analysis, his team would then be able to see which strains of yeast have antagonistic properties against pests, bacteria, or harmful fungi.

After isolating and reproducing the yeast strains that exhibit potential biocontrol properties, BIOTECH would then test out the biocontrol yeast in the form of a powder-like

substance mixed with water, sprayed onto the fruits and vegetables.

As of today, BIOTECH-UPLB is focused on testing the yeast product on mango. According to Dr. Pedro, their focus on mango production presents greater urgency because of the farmers' heavy dependence on chemical. "Matindi ang schedule ng pag-spray ng insecticide and fungicide sa mangga, usually every seven to ten days, seven to eight times bago ito pipitasin," said Romualdo Yecyec, one of the research staff working with Dr. Pedro.

At present, mango growers across the country depend on this practice to ensure optimal export quality of the mango produce. Dr. Pedro pointed out that one major cause of market loss is the indication of too much chemical residue in mango deeming the produce to fail exporting standards.

From the potential biocontrol yeast isolates that Dr. Pedro has tested in the lab, BIOTECH-UPLB has now been conducting field tests of the finished products in mango plantations within Batangas. He hoped that through further studying the best pest control options nature has to offer, BIOTECH-UPLB can eliminate or reduce the farmer's dependence on chemical pesticide.

Dr. Pedro is open to collaborating

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Addressing jackfruit's lead destroyer

by Patrick Raymund A. Lesaca

Jackfruit (*Artocarpus heterophyllus* Lam.) belongs to the Moraceae family. It is an evergreen medium-sized to large tree with a long taproot and dense crown, and an important tree crop in tropical and subtropical regions. It is grown in home gardens and commercially in orchards.

The fruit, used both immature and mature, is the primary product.

The fruit pulp is sweet and tasty when ripe. The seeds may be cooked. The fruits and seeds may be processed in a variety of ways. Immature green fruits are used as vegetable. The rind can be processed for syrups and jellies. The leaves can have used as animal feed. The wood of mature trees can be processed into lumber and used for example in guitar making in some areas in the Philippines.

In 2016, the Philippine Statistical Authority (PSA) reported that the domestic production of jackfruit, on the average, was recorded at 43.4 thousand metric tons (tmt) during the three-year period (2014-2016). It posted a continuous reduction from 44.6 tmt in 2014 to 42 tmt in 2016 or an average decline of 2.94 percent per year. Imports of jackfruit ranged from 16 mt in 2016 to 23 mt in 2015. Exports were high in 2016 at 26 mt. It exhibited a downtrend from 41.9 tmt in 2014 to 39.5 tmt in 2016. Annual per capita net food disposable declined from 0.42 kilogram in 2014 to 0.38 kilogram in 2016.

One of the causes of decrease in jackfruit productivity, particularly in Eastern Visayas region of the Philippines, dubbed as the jackfruit capital, is the occurrence and high incidence of a disease called *Phytophthora palmivora* Butler. The *P. palmivora* is a disease that is affecting the production of the fruit in the country. It also affects the seedling

causing dieback and mortalities. Symptoms include trunk cankers, wilting and dieback of the canopy and, in many cases, tree death. The decline resulted in significant yield losses for farmers. The discovery and evaluation of potential alternative medicine or chemical for the sick jackfruit trees is however necessary, hence the project.



(Right) Spraying chitosan on plants inoculated with *Phytophthora palmivora* (Left) jackfruit seedling stem injection with 200 ppm chitosan solution was the most cost effective method of chitosan treatment application. PHOTO BY Department of Pest Management - VSU

To address this, the Visayas State University (VSU) embarked on a project titled, "Chitin and Chitosan Extractions from Crustacean Exoskeleton: Evaluation of their Potential Together with Chitin-Containing Indigenous Materials for the Control of *Phytophthora* Disease of Jackfruit." The project, funded by the Bureau of Agricultural Research (BAR), is led by Dr. Lucia M. Borines, head of the Department of Pest Management, VSU, together with Dr. Candelario L. Calibo also from VSU. The project aimed to produce chitin and chitosan from chitin-containing crustacean exoskeleton wastes, and to evaluate their potentials with raw materials for the control of *Phytophthora palmivora* in jackfruit.

Getting to know the disease
Phytophthora ("Plant

Destroyer") diseases are among the most economically significant diseases of fruit tree crops in the tropics. In particular, *P. palmivora*, has the ability to cause multiple diseases on the same host and can attack a wide range of different host species. It affects important tropical crops, including, cacao, durian, coconut, pepper (sweet and black), citrus, potato, and just recently, jackfruit.

The management of *Phytophthora* diseases is best observed by avoiding infection through basic hygiene, limiting susceptibility through drainage and irrigation, improving soil health, use of disease resistant germplasm and biological and chemical control. The use of disease-free planting materials, site preparation and establishing good drainage will not only limit *Phytophthora* disease, but will also improve soil health and benefit the host plant directly.

Chitin and chitosan

Chitin (C₈H₁₃O₅N) is a long-chain polymer of a N-acetylglucosamine, a derivative of glucose, and is found in many places throughout the natural world. It is the main component of the cell walls of fungi, the exoskeletons of arthropods such as crustaceans (e.g., crabs, lobsters, and shrimps) and insects, the radulas of molluscs, and the beaks and internal shells of cephalopods, including squid and octopuses.

Meanwhile, chitosan, a polymer of β -(1-4)-linked D-glucosamine residues, is a deacetylated derivative of chitin reported to possess antimicrobial properties and act as potent elicitor of plant resistance against some pathogens. It was proven effective in controlling potato brown

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of the production and marketing of native chicken.

In Western Visayas, the native chicken strain that is indigenous and most dominant in the region is *Gallus domesticus*, more commonly known as *Darag* chicken. For DA-RFO 6, the Western Visayas Integrated Agricultural Research Center (WESVIARC) and the Bureau of Agricultural Research (BAR) have been conducting Community-based Participatory Action Research (CPAR) projects wherein farmer-beneficiaries are provided with an initial stock of breeders, trainings, and technical assistance as part of the integrated farming systems introduced to them. "Aside from the provision of stocks, we also give deworming and vaccination services, we teach

our beneficiaries how to strengthen the resistance of native chicken the organic way by feeding them with herbs such as *Trichanthera*," said Ms. Anelyn Hapitan, Livestock Research Section Chief of DA-RFO 6.

The National Organic Agriculture Program, through the collaboration of West Visayas State University and DA-RFO 6, had just recently concluded the project titled, "Demonstration of Organically-Produced *Darag* Native Chicken." The study was authored by now retired university professor, Dr. Bernabe Cocjin who came up with a series of recommendations on how to raise and make a profit out of native



Staff from DA-RFO 6 turns over a batch of native chicken breeders to a local farmer (first one on the right)
PHOTO BY: EGESTUPA

chicken.

Dr. Cocjin reiterated that vaccinations against Newcastle Disease, Avian Pest, and *Coryza* should be administered even to organically-grown native chicken.

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rot caused by *Alternaria alternata* and in reducing bacterial blight lesion lengths in rice, among others.

Project results

The project proponents delved into the local extraction of chitin and chitosan from crab and shrimp exoskeleton and evaluated chitin and chitosan from crab and shrimp exoskeletons as well as raw chitin-containing indigenous materials against *Phytophthora palmivora* in vitro, and further evaluated the efficacy of the test materials in controlling infections in inoculated jackfruit seedlings, among others.

Researchers studied the antifungal activity of chitin, chitosan and raw chitin-containing materials, and were evaluated against *P. palmivora*, as well as their effectiveness in controlling the disease in jackfruit seedlings. From these results, conclusive evidence showed that chitosan showed direct antimicrobial activity against *P. palmivora*, while chitin and raw had none.

Both chitin and chitosan, however were effective in controlling the disease in inoculated jackfruit seedlings. The chitin-containing raw materials also slightly reduced *P. palmivora* lesion size but were inferior to that of chitosan, and

chitosan was more effective in reducing lesion length when applied before pathogen inoculation or as preventive treatment than when applied after pathogen inoculation or as eradication treatment.

Three hundred ppm (parts per million) chitosan dissolved in 0.3 percent acetic acid inhibited the growth of *P. palmivora* in vitro. This indicated chitosan's direct antimicrobial property against *P. palmivora*. However, chitin did not show direct antifungal activity against the pathogen, but when used to treat inoculated jackfruit seedlings, both chitin and chitosan were effective in reducing *P. palmivora* canker lesion size. Both were therefore effective in controlling the disease.

Among the manner of chitosan application, stem injection with 1 ml of 300 ppm solution was the most cost-effective method of chitosan application to seedlings, followed by weekly spraying. Chitosan was more effective in reducing *P. palmivora* lesion length and width when applied two times root drenching at weekly interval before pathogen inoculation. Its preventive property is therefore better than its eradication property.

According to Dr. Borines selected jackfruit farmers gained additional knowledge and skills in managing *Phytophthora* disease

through participation action research (PAR) trials they conducted. Farmers also learned other best practices in orchard management from local scientists and from each other through farm cross-visits and interactions during farmer field days (FFDs) and extension training. After series of actual experimentations done in the farm, increased the health status of the jackfruit trees in their farm, had reduced costs of production, and had lowered losses due to the disease and increased yield and the farmers' incomes, among others, were obtained. Moreover, the involvement of local government units raised the awareness some policymakers in the region about the importance of this disease and its management.

The researchers did a cost and benefit analysis between commercially produced crab chitosan and shrimp chitosan against locally extracted crab and shrimp chitosans which revealed a whopping price difference of roughly Php2,000 per grams for both crab and shrimp chitosans. ###

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BAR-NSRI research fellow presents study results on *E. coli*



PHOTOS BY DBATTAD

Dr. Pierangeli G. Vital (left) presents the findings of her study in a public seminar held at BAR. Pictured on the right is Ms. Digna L. Sandoval, head of the Institutional Development Division that supported Vital's Research Fellowship.

Dr. Pierangeli G. Vital of the University of the Philippines Diliman presented the results of her study titled, "Multilocus Sequence Typing (MLST) of *Escherichia coli* from Various Agricultural Sources for Food Quality Monitoring" in a public seminar organized and sponsored by the Bureau of Agricultural Research (BAR) on 4 May 2018.

Dr. Vital, a senior scientist research fellow, is a grantee of the "Post-Doctoral and Senior Scientist Research Fellowship in Basic Research in Agriculture in Fisheries" a program of BAR and the University of the Philippines Diliman-Natural Sciences Research Institute (UP-NSRI). To date, 16 promising scientists have been supported by the program contributing to the increasing number of qualified researchers and skilled scientists in the agri-fisheries sector in the country.

Dr. Vital's study focused on using MLST to provide a unique profile for *E. coli* that could help identify the sources and reservoirs of microorganism on agricultural food such as fruits and vegetables and determining its host preference and virulence potential on human infection. The study aimed to address several issues, particularly on microbial contamination in our fresh agricultural commodity produce.

According to Dr. Vital, food safety has become a primary public concern and a significant challenge in the Philippines. Noticeably, it's progress to strengthen food safety systems has been attained in other countries to reduce and prevent food-borne diseases. However, unacceptable rates of food-borne illnesses remain and new hazards continue to enter in the food supply chain.

In the Philippines, a growing interest in the food industry showed an increasing popularity of fresh and fresh-cut produce. Over the past 10 years, the fruits and vegetables industry have experienced growth due to its increasing consumption. "Consumers perceive these products as healthy, tasty, convenient and fresh. Preference for fresh and fresh-cut products has however brought consumers greater risks of contracting microbiological food-borne illnesses and one of the most common food-borne pathogen from it is the *Escherichia coli*," said Dr. Vital.

E. coli is a Gram-negative, rod-shaped bacterium commonly found in the gastrointestinal tract. It is also the most implicated pathogen of diarrheal cases worldwide. Most *E. coli* is harmless and actually is an important part of a healthy human intestinal tract. However, some *E. coli* are pathogenic, meaning they

can cause illness, either diarrhoea or illness outside of the intestinal tract. The types of *E. coli* that can cause diarrhoea can be transmitted through contaminated water or food, or through contact with animals or persons.

Dr. Vital explained the use of MLST in her study to characterize and differentiate the various types of *E. coli* from different agricultural sources. She defined MLST as a type of molecular genotyping technique which measures the DNA sequence variations of a set of housekeeping genes that would provide a unique allelic pattern or profile of the organism. She touted the wide array of application of this technique as imperative in conducting surveillance of fresh produce for microbial contamination resulting in disease detection and prevention.

Based on the results using MLST, six pathotypes from the bacterial isolates samples of bell pepper, carrots, lettuce, tomato and mungbean from open air markets and supermarkets in Luzon were determined and were associated with microbial contamination resulting to diarrhoea. These were: *Enterotoxigenic E. coli* (ETEC), *Enteroinvasive E. coli* (EIEC), *Enteropathogenic E. coli* (EPEC), *Enteraggregative E. coli* (EAEC), *Enterohemorrhagic E. coli* (EHEC), and Diffusely Adherent *E. coli* (DAEC).

Dr. Vital also found out that the prevalence of this microbial contamination among fresh produce was due to grossly contaminated agricultural irrigation water uses and compounded by poor food handling during its distribution.

Dr. Vital is currently developing a protocol in addressing the issues on microbial contamination of fresh produce. The protocol will provide a rapid and accurate identification benefiting merchants, consumers, and even policymakers. ### (Leoveliza C. Fontanil)

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Other natural sources of medicinal and antiparasitic plants include pepper, *makabuhay*, *alibhon*, ginger, calamansi, *madre de cacao*, and Arica nut. Aside from directly feeding these medicinal plants to the chickens, growers can also pound the fruits/leaves and infuse it to the drinking water. Protein sources for native chicken include *malunggay* leaves, *ipil-ipil* leaves and fruits, *madre de agua* (*Trichanthera gigantea*), copra meal, white ants, fresh coconut meat, and dried skim milk (for starter chicks only and used sparingly.)

Kitchen refuse or leftover food can also be fed to native chicken. Dr. Cocjin ferments his kitchen refuse with bakery yeast to increase its protein content and lengthen its preservation.

Dr. Alfredo Gulmatico, one of Dr. Cocjin's colleagues in the conduct of the study is currently raising 400 heads of native chicken and makes sure to grow the livestock in separate areas so as to preserve his chickens from getting infected all at once. "It's a form of bio-security. So as to keep your breeders from getting sick," added Dr. Gulmatico.

When asked about why he prefers raising *Darag* native chicken, Dr. Gulmatico said, "one of the traits of *Darag* chicken is they are not aggressive towards each other. *Kahit ihahalo mo yung mga lalaking manok, hindi sila nagaaway. Kasi may hierarchy sila.* Unlike other strains of native chicken."

Dr. Gulmatico raises his native chicken as free-ranging. He believes that it is the chicken's free-range activities that make *Darag* flesh taste better compared to commercially-produced chicken raised inside cages.

According to Dr. Cocjin, 50 heads of native chicken serving as breeders is what is needed for the practice to be profitable. He recommended that farmers who venture into native chicken production shouldn't start with a brood of chicks; rather the initial investment should be on hardened chicks that are 75 - 90 days old, bought at 150 pesos per head. Ready-to-lay pullets are sold at 350 pesos per head and male native chicken at 400-450 pesos. When



Native chicken is raised to be free-ranging. DA-RFO 6 advises its farmer beneficiaries to plant crops such as malunggay, ipil-ipil, and madre de agua as these are a good source of protein. Raisers can also integrate kitchen leftovers (inset right) in the chicken's diet.

PHOTOS BY: EGESTUPA



Dr. Alfredo Gulmatico

selling native chicken eggs, they go for 10 pesos a piece.

"In Western Visayas, native chicken is very important because we are the top producing region all over the country. Sa katunayan, based on the survey of the Philippine Statistics Authority, annual production in the Negros Region is 7 million and in Western Visayas, also 7 million," said Cyson Altis, science research specialist, Livestock Research Section of DA-RFO 6.

Mr. Altis added that despite the 14 million native chicken produced annually, local farmers still could not fully supply the demand for native chicken in the region. "Take for example, a very prominent restaurant chain here in Iloilo, on an average day, they dress and cook 600 heads of chicken for their customers."

"We continue going to

communities, spreading awareness of our programs and developed interventions on native chicken. We put up techno-demo sites so that farmers know how to replicate the practice themselves," added Ms. Hapitan.

For Dr. Gulmatico, he mentioned that if he were to only supply his friends in the medical field who are ordering his chicken, he would run out of breeders fast. So he is compelled to limit his sales in order to keep his business sustainable, as well as to leave stocks for the dining establishments who order from him.

He won't be giving up on raising native chicken anytime soon. He plans on doing it full time after retiring as a doctor.

Drs. Gulmatico and Cocjin's vision for the native chicken producers in Western Visayas is the establishment of strong cooperatives of *Darag* raisers. Dr. Cocjin accounted his observations on the livestock industry of New Zealand and Australia, where farmers manage to export their livestock in a commercial scale because of standardized production systems. "If we have a strong cooperative of *Darag* raisers, we can have standardized production, we can finally go into scale production," Dr. Cocjin concluded. ###

BAR-WorldFish partnership boosts aquaculture RDE

The partnership between the Bureau of Agricultural Research (BAR) and WorldFish has led to the promotion of a sustainable fisheries and aquaculture in the Philippines through research and development and extension (RDE).

WorldFish, an international and nonprofit research organization that harnesses the potential of fisheries and aquaculture to reduce hunger and poverty, is one of the 15-member centers supported by the Consultative Group on International Agricultural Research (CGIAR). Its research initiatives seek to develop especially the smallscale fisheries and aquaculture sector towards food security.

Marking its nine-year scientific collaboration, BAR has supported a total of 13 projects under the bureau's applied and technology

commercialization programs.

Among the focus of the projects include the development of fisheries management approaches on smallscale levels; climate change adaptation strategies; aquaculture technology commercialization and awareness programs; building capacities of aquatic-agriculture systems; development of modalities for securing aquaculture food systems; development of Nile tilapia strains; and technology business incubator (TBI) program.

One of the high-impact projects implemented by WorldFish is the development of the best performing strain of Nile tilapia in the Philippines. With BAR's funding and technical support and with partners from the Bureau of Fisheries and Aquatic Resources-National Freshwater Fisheries Technology Center (BFAR-NFFTC)

and Freshwater Aquaculture Center-Central Luzon State University (FAC-CLSU), the project aimed to sustain the country's position as one of the top five tilapia producers in the world after China, Egypt, and Indonesia.

Likewise, recognizing the effects of climate change to the country's food source, projects on vulnerability assessment and resiliency development of farming and fishing communities across the Philippines were implemented. In return, these have greatly contributed to determine and reduce – if not totally eliminate – the possibilities of risk which may jeopardize the environment, thus food resources.

With currently 19 international partners, BAR, as the lead arm for R&D of the Department of Agriculture (DA), recognizes the value of international cooperation as a currency in addressing global challenges, while fostering healthy inter-country networks, bridging R&D gaps, and sharing knowledge and resources beneficial to the sector. ###
(Daryl Lou A. Battad)

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with local farmers who have access to mango plantations and who are willing to offer their area in testing out the biocontrol products developed from the project. ###

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Through BAR's partnership with WorldFish, aquaculture is further promoted as a viable income-generating practice. Its impact not only improves the economic status of small-scale fisherfolk but also supports the DA's efforts of preserving aquatic resources.

PHOTO BY WORLDFISH



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