Meeting among BAR, AMAS...from page 9

research and development; (2) screening indigenous and endemic natural products for therapeutic properties; (3) boosting research in the regions and harness biodiversity; and (4) promoting the scientific validation of traditional and locally used medicinal natural products while encouraging institutional collaborations.

The program taps various State Universities and Colleges in the country to conduct research studies. Ms. Melissa Bulao, staff from PCHRD also mentioned that the Department of Agriculture, through the Bureau of Animal Industry and Bureau of Fisheries and Aquatic Resources, has provided assistance in regulatory support and accreditation

Started way back in 1977, PCHRD implemented the National Integrated Research Program on Medicinal Plants (NIRPROMP) to develop safe and effective medicinal preparations from indigenous plants to cushion the effects of escalating prices of drugs and increase its availability in rural areas. This program identified 'Sampung (10) Halamang Gamot' (10 medicinal plants) that have since been adopted by the DOH for use in Primary Health Care, and published a list of 83 other plants which underwent rapid screening tests for therapeutic use.

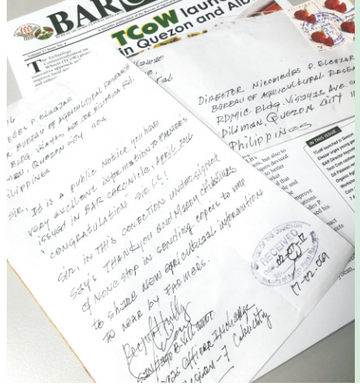
In turn, Mr. Anthony B. Obligado, head of BAR-TCD, discussed Indigenous Plants for Health and Wellness (IPHW) RDE Program of the Department being coordinated by the bureau. Some of the technologies generated under BAR's NTCP cover natural ingredients, health and wellness, and herbs and spices (garlic, chili, oregano, mushroom, *sapinit*, tamarind, *saluyot* and *okra*) and research on the medicinal properties of the identified plant commodities.

Promoting and highlighting the importance of indigenous plants and their by-products in improving people's health, the IPHW program covers studies of the country's indigenous plants as to their various purposes such as functional food, herbal medicine, and as raw material for pharmaceutical and cosmeceutical products.

PCHRD staff also presented an overview of the National Unified Health Research Agenda (NUHRA) 2011-2016 that aims to "provide focus and direction on health research and development efforts that will address the country's health concerns for 2011-2016". This is similar to the Research and Development, Extension Agenda and Programs (RDEAP) 2016-2022 of BAR, which serves as a time-bound and feasible research and development master plan for the next medium-term that is responsive to the current environmental, market and global challenges, and other issues/concerns facing the agriculture and fisheries industry. This serves as a reference material, not only for BAR, but primarily for its partner implementing agencies what R&D activities must be pursued to guide the path towards a competitive, sustainable, and resilient agriculture and fishery sector.

PCHRD serves as the sectoral planning council of DOST tasked to direct and coordinate all health-oriented research and development (R&D) activities under the Philippine health research system. ### ***(Ma. Eloisa H. Aquino)***

—Letter of Appreciation—



Who said that handwritten letters are not in anymore?

Just in time for this love month, we are delighted to receive a letter of appreciation from Mr. Santiago Villamor of Cebu City. In his letter, he expressed his gratitude to Director Nicomedes Eleazar for being a recipient of BAR Chronicle that contains, according to him, "very excellent information to farmers."

BARChronicle
BUREAU OF AGRICULTURAL RESEARCH
RDMIC Bldg., Visayas Ave., cor. Elliptical Rd.
Diliman, Quezon City 1104
PHILIPPINES

Entered as second class mail at the Quezon City Central Post Office under permit no. 2C-14-01-148 NCR

ISSN 1655-3942

BAR Chronicle

BUREAU OF AGRICULTURAL RESEARCH

www.bar.gov.ph Bureau of Agricultural Research dabarofficial

Volume 18 Issue No. 2 | A monthly publication of the Bureau of Agricultural Research | February 2017

Research managers convene for 1st quarterly meeting

To ensure harmonized efforts in agriculture and fisheries research and development (R&D) within the Department of Agriculture (DA), the Bureau of Agricultural Research (BAR) called the DA's regional technical directors, research managers, and selected technical staff of the DA-Regional Field Offices and Bureau of Fisheries and Aquatic Resources-Regional Offices to the first quarterly research managers' meeting. This was held on 23 February 2017 at the BAR Conference Hall, Diliman, Quezon City.

Institutionalized in 2014, the quarterly meeting serves as a venue for BAR to update the DA R&D community on the status of its operations, and in turn, for BAR to be informed on the research initiatives of each region and discuss the R&D issues and challenges faced by the regional offices.

Leading the event was BAR Director Nicomedes P. Eleazar and Assistant Director Teodoro S. Solsoloy, together with the division and unit heads of the Bureau. Dr. Eleazar, in his message, gave credit to the agencies behind the successes attained by the Bureau. "As our major partners in the implementation of R&D activities in the many localities of the country, the DA-regional research stations and centers play a valuable part in attaining the goals of the Bureau. Our partnership has always been very strong and I see this as one of the main reasons why we continue to succeed in our endeavors," he said.

Furthermore, he encouraged the research directors and managers to revisit and realign the research priorities of each region to the directives of Agriculture Secretary Emmanuel F. Piñol, specifically citing the policies behind the creation of the Special Area for Agricultural Development (SAAD) and the Philippine Rural Development Project (PRDP). He also mentioned the need for the regional offices to strengthen and intensify their campaigns on disseminating and transferring information and technologies to their clienteles including the conduct of seminars and trainings.

BAR Director Nicomedes Eleazar addresses the concerns of research managers during the 1st quarterly meeting held at BAR. PHOTO:DRDELEON

Highlight of the meeting was the presentation of Zonal RDE Networks for Luzon, Visayas, and Mindanao. Ms. Lovelyn Gaspar of DA-RFO 2 presented the report of the Luzon group, Engr. Leonarda Londina of DA-RFO 8 presented the output of Visayas, and lastly, the Mindanao report was presented by Ms. Fe Abragan of DA-RFO 10. The presentations centered on the accomplishments of the zonal R&D activities, the status of on-going R&D projects conducted per region, the new projects for consideration for BAR funding, and proposed R&D activities for 2017 such as the conduct of zonal technology fora and this year's CPAR congress.

On the part of BAR, the new activities lined-up that need the cooperation of the regional offices are the finalization of a unified R&D system for BAR-funded projects, call for nominations for the 2017 Gawad Saka Search for Outstanding Agricultural Scientist and Researcher, call for papers for the 29th National Research Symposium, and conduct of Competitive Research and Development Grants Manual (CRGM) proposal writeshop, among others. ### ***(Diana Rose A. de Leon)***

IN THIS ISSUE...

PHOTO:MSVALDEABELLA

Dr. Nicomedes Eleazar, director of BAR, mentions in his message the importance of capacitating research institutions in the country in light of the ASEAN integration.

BAR director opens ASEAN regional forum for ARD researchers

In partnership with the Bureau of Agricultural Research (BAR), the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) conducted the "Regional Forum on State-of-the-Art of Agricultural Research and Development and its Implication on ASEAN Integration" at SEARCA, Los Baños, Laguna, which opened on 27 February 2017. An essential part of the BAR-commissioned research project titled, "Strengthening Agricultural Research and Development (ARD) towards ASEAN Integration", the three-day forum featured 14 country paper presentations in the fields of social, natural, and physical sciences.

In his opening remarks, BAR Director, Dr. Nicomedes P. Eleazar, described the project as one of the strategies needed to capacitate the country's research institutions respond better to the challenges of the ASEAN integration. In his words, "BAR realized that in order to do that, the capabilities of Philippine agricultural research institutions must, at the very least, be at par with those of the other members of the ASEAN. We must continue to be relevant as regards responding to the needs and demands of Philippine agriculture while continually being innovative, dynamic, and integrated with the ASEAN and global communities."

The Bureau director also took the opportunity to thank SEARCA for its constant support to the Bureau that is manifested in the projects and activities that the two agencies have collaborated on. According to Dr. Eleazar, he is grateful for SEARCA's "dedication and efforts to continuously serve the Philippine agriculture sector with the wealth of its expertise and linkages." He added how SEARCA has been one of the bureau's esteemed partners in continually capacitating Filipino researchers which, as he emphasized, is one crucial step for ensuring the competitiveness and sustainability of Philippine agriculture in the face of changing local and international agricultural landscapes.

Aimed to ensure that agri-fishery institutions continue to be relevant and responsive to current and projected needs of the sector in light of the ASEAN integration, the project looked into how R&D institutions are faring and how we can keep up with the rest of the ASEAN countries in terms of agricultural research. Using the results of the comparative studies and assessments of the ASEAN countries conducted by the project implementers, SEARCA conducted a series of training workshops in the last quarter of 2016 that aimed to capacitate local researchers from DA-Regional Field Offices (RFOs) and state universities and colleges (SUCs) on more advanced research methods and analytical techniques in the physical, natural, and social sciences.

SEARCA Director, Dr. Gil Saguiguit, Jr., welcomed the participants to the event while Bioversity International Honorary Research Fellow, Dr. Agustin Molina,

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BARChronicle
BUREAU OF AGRICULTURAL RESEARCH

BAR CHRONICLE is published monthly by the Applied Communication Division of the Department of Agriculture - Bureau of Agricultural Research, RDMIC Building, Visayas Avenue, cor. Elliptical Road, Diliman, Quezon City 1104 Philippines.

This publication provides regular updates on DA-BAR's activities as the country's national coordinator for agriculture and fisheries R&D. It also highlights features and news articles concerning NaRDSAF-member institutions.

PRODUCTION TEAM

Editor:	Victoriano B. Guiam
Consulting Editor:	Julia A. Lapitan
Managing Editor/Layout:	Anne Camille B. Brion
Writers:	Ma. Eloisa H. Aquino, Daryl Lou A. Battad, Anne Camille B. Brion, Diana Rose A. de Leon, Leoveliza C. Fontanil, Ephraim John J. Gestupa, Patrick Raymund A. Lesaca, and Mara Shyn M. Valdeabella
Reproduction:	Ricardo G. Bernardo
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ACD Head:	Julia A. Lapitan
Advisers:	Dr. Nicomedes P. Eleazar, CESO IV and Dr. Teodoro S. Solsoloy

ISSN 1655-3942

For subscription and inquiries, please contact us at: Tel. Nos: +63 (2) 461-2800 or 461-2900 local nos. 1136, 1143, 1132, 1138 Fax No. +63 (2) 927-5691 Email: *acd@bar.gov.ph*
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Pangasinan under the Bureau's National Technology Commercialization Program. This project aims to increase the region's total goat population and doe-level inventory, increase the number of adopters of recommended goat technologies, decrease mortality rate, strengthen the marketing system for slaughter goats, develop value-adding products, and strengthen goat raisers associations. In essence, this project will further boost the goat industry in the region by focusing on the upscaling of goat technology commercialization.

Adoption of Innovative Goat Production System

One focus of the technology commercialization project is on increasing the number of goat raisers adopting what the DA-RFO 1 calls, 'Goat Check System'. This POT was piloted first by the Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD), and later adopted by DA-RFO 1 for its goat R&D initiatives. Under this system, three critical points of goat production POTs were improved, namely, breeding management, feeding management, and animal health management.

Under breeding management, genetic improvement through crossbreeding of existing goat stocks with superior breeds such as Anglo-Nubian and Boer is done to produce kids with improved genetic potentials in terms of growth rate, body size, and milk yield. Controlled breeding is highly encouraged as to prevent unwanted breeding results and to produce a higher percentage of kids with superior qualities.

Use of locally-available but cheap feeding materials is the emphasis of the goat production system. Urea-treated rice straw as roughage, intensified use of multi-purpose tree species such *as ipil-ipil*, *kakawate* and other tree legumes and grasses, and urea-molasses mineral blocks (UMMB) are the recommended practices under feeding management. UMMB is "a feed supplement containing urea, molasses, salt, mineral mixture, bran and vitamins solidified with cement". Stall feeding is suggested to encourage the consumption of more balanced forage diets and to reduce parasite infestation.

For animal health management, it is advised to practice strategic deworming by planning carefully the use of chemical dewormers, rapid rotational grazing – a process of subdividing the pasture into paddocks and moving the animals from one paddock to the next every 3.5 days, and lastly the adoption of improved housing.

Dr. Jovita Datuin of DA-RFO 1, together with BAR staff, meet with goat raiser associations in Pangasinan as part of the project. PHOTO COURTESY OF GAMALINAO

Based on the data gathered by the project implementers, improved housing, stall feeding and legume supplementation, genetic upgrading, and strategic deworming are the most popular of the technology options adopted by goat raisers.

From the original 52 farmer-partners of the project in the project sites, this has increased to more than 200, signifying the attractiveness and effectiveness of the POTs offered by DA-RFO 1.

Reaping impacts

Due to the strong support from the local government units (LGUs) of the project sites in Pangasinan for strengthening their respective goat industries, it became easier for the implementers to run the course of the series of planned R&D activities they prepared for the project. They were also able to establish goat multiplier farms in Balungao, Bayambang and Manaoag which are LGU-led. Aside from being the source of breeder stocks, these multiplier farms will also host interested goat raisers in a cross-visit scheme. The municipality of Balungao has since passed a resolution declaring goat as the municipality's OTOP (One Town, One Product).

Goat raisers associations were strengthened through the project. Some have been assisted by the DA-RFO 1 from their founding up to getting DOLE registration. These associations are : 1) Dangro Raisers of Balungao, 2) Bayambang Integrated Active Goat Raisers Association, 3) Manaoag Goat Federated Association, 4) Banog Sur Goat Raisers Association INC, 5) Centro Toma Goat Raisers Association, and 6) San Simon-Dacap Norte Goat Raisers Association.

The product development component of the project is also progressing. In collaboration with the Bureau of Animal Industry–Animal Products Development Center (BAI-APDC), selected participants were trained on goat slaughter, cutting and processing. Product standardization for chevon specialty dishes such as chevon *sisig*, *caldereta* and chevon floss is also underway. A significant milestone achieved by the project is the development of micro nutrient balls, a feed supplement packed with nutrients (phosphorus, zinc, manganese, copper, and iron) which is safe even for pregnant does. It was given a special citation for non-food product during BAR's 12th National Technology Forum held in August 2016 at SM Megamall, Mandaluyong City. ###

For more information, contact:
Dr. Jovita M. Datuin
Project proponent/Research Division Chief, DA-RFO 1
San Fernando City, La Union
Mobile No.:0908-399-8946
Email: *jovitamdatuin2016@gmail.com*

PHOTO COURTESY OF GAMALINAO

GOAT R&D IN REGION 1
progresses by leaps and bounds

Story by Diana Rose A. de Leon

In terms of market share and popularity among Filipino consumers, goat's meat, also known as chevon, pales in comparison to other meat products such as pork, chicken, and beef. Even so, its economic importance cannot be taken lightly as a significant number of small-hold farming households rear goats for domestic consumption and/or as an immediate source of cash.

Hence, in its drive to promote the incentives of goat-raising, the Department of Agriculture (DA) has been putting together efforts to promote packages of technologies on goat production nationwide. One of the technology endeavors that is bearing fruit is the initiative of DA-Regional Field Office (RFO) 1.

Goat R&D

In the Ilocos region, goat is one of the champion commodities, thanks to the efforts of DA-RFO 1 on continuous and intensive conduct of research and development (R&D) initiatives to improve goat productivity and promote goat raising as a lucrative enterprise. Ilocanos quickly saw the potential of goat to be an alternative source of livelihood, thus, making for goat raising as one of the important economic activities for the farming communities in Region 1 today. According to reports submitted by DA-RFO 1, as of July 2016, the Ilocos region already had the highest goat inventory in backyard farms in the country.

This success is also attributed to the support received by DA-RFO 1 from various R&D-assisting institutions that include the Bureau of Agricultural Research (BAR). The Bureau has been supporting the goat R&D initiatives of the region since 2005 through its Community-based Participatory Action Research – Agribusiness Development Project (CPAR-ADP). Starting from 2 cities and 4 municipalities in Ilocos in the period, 2005 – 2009, there are, at present, a number of municipalities added to the list that are engaged in goat production which the DA-RFO 1 has been assisting through the introduction of superior goat breeds, improved farming practices with adoption of recommended packages of technology (POTs), and strengthening of the capacity of goat raisers.

Another recent initiative supported by BAR is the "Technology Commercialization of Slaughter Goat in Region 1" in

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Adlay TWG members, focal persons set directions for Adlay R&D Program

BAR Assistant Director Teodoro Solsoloy speaks in front of the *adlay* focal persons and encourages them to further look into the potentials of *adlay* as an alternative crop to rice and corn. PHOTO:ACBRION

Following the directive of Agriculture Secretary Emmanuel Piñol to intensify initiatives on *adlay*, the Bureau of Agricultural Research (BAR) called a special meeting and planning workshop of the members of the National *Adlay* Technical Working Group and focal persons from the Department of Agriculture-Regional Field Offices (DA-RFOs), Central Mindanao University, and BAR on 15-17 February 2017 at the Bureau's office.

With guidance from the *Adlay* TWG members, the *Adlay* R&D Program's direction was reviewed and revisited to ensure that activities are aligned to the DA's current thrusts – with emphasis on harnessing the potentials of *adlay* for health and wellness, and more importantly, as an alternative food staple commodity that can help in the country's bid of achieving food security.

Focal persons from the regions presented their respective project proposals which included plans for *adlay*-related R&D activities for 2017-2018. Among those presented were: intensifying seed production in expansion areas, verification trials of *adlay* varieties intercropped under different crop-based farming systems (coconut, rubber, legumes, cashew, etc.), further improvement of current packages of technologies and value-added products, refinement of developed postharvest equipment and facilities, strengthening promotional activities, conduct of market research, establishment of *adlay* processing centers in major producing areas, and exploring the possibility of rehabilitating abandoned mine areas through the introduction of *adlay* intercropped with other crops.

Coming from the same family to which wheat, rice, and corn also belong, *adlay* is a tall grain-bearing tropical plant that is found to be adapted well in some regions, particularly in high elevation areas such as the hillsides of Nueva Vizcaya, in Zamboanga Peninsula, Northern Mindanao, and in some other parts of the country. It has also been found out that *adlay* is accepted as an alternative staple food by Indigenous Peoples (IPs) such as the Subanen tribe in Zamboanga del Sur. Chemical composition analysis conducted by the Food and Nutrition Research Institute in 2012 reveal higher protein content in cooked *adlay* grits (3.7 g) as compared to well-milled, boiled rice (2.1 g).

Under the *Adlay* R&D Program which pushes for the development, utilization, and promotion of *adlay* as an alternative crop to our food staples, various product development efforts have been undertaken to further promote its utilization. These include Pinoy Gourmix developed by DA-RFO 2, *adlay* breakfast cereals and wine by DA-RFO 10, *adlay champorado* by DA-RFO 4A, *adlay* crackers by DA-RFO 12, and *adlay* coffee by DA-RFO 5 and 9, among many others.

As of February 2017, BAR had already supported 51 *adlay*-related projects being implemented by the DA-RFOs, the Philippine Center for Postharvest Development and Mechanization, and selected state universities and colleges. ### ***(Anne Camille B. Brion)***

Members of the National *Adlay* Technical Working Group discuss the next plans of action to take for the directions of the *Adlay* R&D Program. PHOTO:ACBRION

Technologies shared, rural improvements noted with TCOW ROLL-OUT

The University of the Philippines Los Baños–College of Development Communication (UPLB-CDC) conducted a synthesis workshop on the project, "Technology Commercialization on Wheels (TCoW)" on 9 February 2017 at SEARCA, UPLB, College, Laguna.

Farmers, provincial and municipal agriculturists from the project's pilot sites in Albay and Quezon, and technology generators who served as resource persons during the conduct of TCoW roll-out (introduction to the public/launching of a product or service) activities which started in June 2016, attended the said workshop.

The TCoW project–an innovative approach to improve local agricultural conditions while enhancing the social marketing appeal of agriculture and fisheries commodities–is being implemented by the UPLB-CDC with funding support from the Department of Agriculture-Bureau of Agricultural Research (DA-BAR) under one of the Bureau's flagship programs, the National Technology Commercialization Program (NTCP). Basically, the TCoW project introduces Packages of Technologies (POTs) to areas that need them the most using a mobile exhibit truck, a popular tool used for bringing technologies and knowledge products to remote areas.

A uniquely-developed exhibit vehicle, the TCoW provides a communication platform for technology generators, microfinance institutions, marketing specialists, and other sectors to present and exchange various information and knowledge on the production, processing, packaging, financing, and marketing of agriculture and fishery products. During the two-day roll-out of the TCoW to communities, the project used audiovisual equipment that enabled the proponent to fast-track the information dissemination process with Information and Communication Technology (ICT).

Dr. Ma. Theresa H. Velasco, dean of UPLB-CDC and TCOW project leader, presented the accomplishments of the project. These include the sharing and demonstrating of 33 technologies to farmers and other stakeholders during the communication campaign held in the target communities comprised of 25 barangays. Unexpectedly, members of neighboring barangays came and participated as well, enabling the project to reach an actual total of 165 barangays. "TCoW was also able to reach far-flung farming and fishing communities never visited before by technology generators. One instance is Brgy. Villa San Isidro in Calauag, Quezon which is three hours away from the *poblacion* which turned out to be a haven for seaweeds that is suitable for value-adding enterprises," Dean Velasco added.

Part of the TCoW synthesis workshop is the conduct of Focus Group Discussions among the participants wherein they share their experiences as to best practices, lessons learned, and success stories, among others. PHOTOS: MEAQUINO

Technologies that were shared the most were the production of Indian mango, turmeric, oregano, and cacao by DA-Quezon Agricultural Research and Experiment Station; *malunggay* by Southern Luzon State University-Judge Guillermo Eleazar and DA-Bicol Integrated Agricultural Research Center (BIARC); sweet potato by DA-Albay Research and Development Center; abaca by Philippine Fiber Industry Development Authority; coconut by Philippine Coconut Authority-Region 4A; *ragiwdiw* by DA-BIARC; and fish processing by Bureau of Fisheries and Aquatic Resources-Region 5.

In the Focus Group Discussions held during the workshop, the participants shared their best practices, lessons learned, and success stories concerning the adoption of the technologies particularly on food processing and packaging. The TCoW paved the way for the once-called farmer-producers to turn into processors of their raw produce. Citing the example of farmers in Legazpi City who learned how to process sweet potato into doughnuts and lumpia, Dr. Velasco said, "This equates to higher income compared to merely selling raw tubers among middlemen and traders".

Further, they shared how the project created positive changes in their personal and social lives and in their values as it strengthened family dynamics, enhanced their self-confidence, helped them achieve self-empowerment, and developed in them a sense of entrepreneurship especially among the farmers.

"Women empowerment turned out to be another result of TCoW as it

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The project is aimed at introducing an alternative agri-fishery system that would provide enough harvestable abalone for a fisherfolk family's daily provisions as well as lessen the collection of the threatened wild abalone.

Researchers from the Western Philippines University(WPU) have discovered that coral reefs in some of Palawan's shoreline are also being destroyed due to widespread unregulated collection of *sobra-sobra* .

R&D efforts to preserve the abalone

In order to preserve the populations of wild abalone along the shores of Palawan, the WPU-College of Fisheries and Aquatic Sciences in partnership with the Bureau of Agricultural Research (BAR), embarked on the project, "Utilization of Indigenous Materials for the Mass Production and Community Farming System of Abalone (*Haliotis asinina*) in Palawan." The project is aimed at introducing an alternative agri-fishery system that would provide enough harvestable abalone for a fisherfolk family's daily provisions as well as lessen the collection of the threatened wild abalone.

Under the leadership of abalone biology and culture expert, Dr. Lota Alcantara-Creencia, WPU developed a hatchery, nursery , and grow-out culture system of abalone in the university's Binduyan Marine Research Station which is an hour's drive north of Puerto Princesa City.

The research initiated to put up mechanisms for fisherfolk families in Taytay, Palawan to receive abalone juveniles three months after they are fertilized in the Binduyan station's abalone culture facilities. This is in coordination with a non-government organization operating in northern Palawan. From the batch given to them by the researchers, the beneficiaries were able to jumpstart their own stock of cultured abalone with the use of their grow-out cages set up along the coast.

Aside from supplying the first batch of abalone culture, fisherfolk families were also taught to utilize indigenous raw materials in mass-producing the grow-out cages used to culture abalone. The grow-out cages are mostly made up of bamboo which, according to the results of WPU's study, is just as efficient as the ones made of PVC. Aside from being cheaper, utilizing indigenous materials also helps the farming communities as the fisherfolk have to outsource their materials from locals who sell bamboo.

The species of abalone that are being cultured in Palawan is *Haliotis asinina*. Compared to other species, *H. asinina* exhibits the largest shell length among Philippine abalones. It also has the fastest growth rate among cultured abalones in the world. *H. asinina* from Palawan is usually exported to countries that have high demand for the shellfish such as Hong Kong and South Korea. Aside from Palawan, abalone is now also being cultured in the provinces of Quezon, Masbate, Marinduque, Antique, Guimaras, Negros Provinces, Samar, Bohol, Surigao del Norte, Surigao del Sur, Zamboanga, and Sulu.

Apart from BAR, WPU is also collaborating with Commission on Higher Education, Department of Science and Technology, Bureau of Fisheries and Aquatic Resources, and the United States Agency for International Development towards preserving Palawan's *sobra-sobra* and helping the local abalone industry. ### ***(Ephraim John J. Gestupa)***

For more information, please contact:
Dr. Lota Alcantara-Creencia
Project Leader
Western Philippines University
Puerto Princesa City, Palawan
Tel. No.: 0928-280-9419
Email: *lotacreencia@gmail.com*

Abalone is rich in Omega 3, iodine, and phosphorous which help in reducing the risk of getting cancer, heart disease, and arthritis. PHOTO COURTESY OF LCREENCIA/WPU

Under the project, fisherfolk are taught to utilize indigenous raw materials such as bamboos in mass-producing the grow-out cages used in the culture of abalone. PHOTO COURTESY OF LCREENCIA/WPU

R&D efforts geared towards preserving ABALONE IN PALAWAN

Story by Ephraim John J. Gestupa

Along the coasts of Palawan is a rare shellfish called abalone. Locals would more often recognize it as *sobra-sobra* (Ilonggo) which, in English, translates as "too much." As abalone reaches maturity, one would notice the sea creature's flesh overlapping its shell covering. Abalone is rich in Omega 3, iodine, and phosphorous which help in reducing the risk of getting cancer, heart disease, and arthritis.

Despite being named *sobra-sobra*, abalone is considered a rarity in the agri-fishery industry. The sea creatures don't just grow under any coastal circumstances. Saltwater salinity must be at a 32-35parts per thousand with the sites as the shellfish thrive nowhere near freshwater sources. Sites also need to have clear and flowing water at all times.

Harvesting wild abalone is an arduous task. Fishermen have to dive down to the bottom of intertidal flats to 10 meters or more and individually handpick those that are fully-grown and mature and take these to the surface. Often, they have to be pried free from underwater rocks. The fisherfolk then offload this onshore. Harvesting is repeated with fresh batches of the shellfish gathered anew until enough abalone is gathered. Because of their nutritional value and the laborious process of harvesting abalone, it is only natural that abalone commands premium price with a kilogram of abalone sold at around PhP300-850 (USD6-17) depending on whether it is live, frozen, or canned.

In South Africa, exporting abalone is mostly done through the black market where tons and tons of the hunted shellfish are transported to countries that generate the highest demand for the product way beyond the country's appointed quota. The amount of abalone leaving South Africa exceeds the limit mandated by the government with an estimated 40,000 tons taken from the wild since 2001. According to an investigative study conducted by National Geographic, smuggling abalone out of the country is easy as it is facilitated by organized criminal groups that coerce poor working class divers.

The risk then that concerns the abalone industry is the depletion of the wild species freely roaming the ocean. While abalone isn't as lucrative in the Philippines as much as it is in South Africa, it is still being hunted down too often by fisherfolk in Palawan.

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CLSU president presents SIAL award to BAR director

In a courtesy call on the BAR Director on 23 February 2017 paid by no less than Dr. Tereso Abella, president of Central Luzon State University in Muñoz, Nueva Ecija, the university presented the fruit of its collaboration with BAR resulting from the making of its "Tilapia Ice Cream". For Dr. Abella and the CLSU officials responsible for the development of the product who accompanied him on this visit, the highly prestigious award received from SIAL is not only for the account of the university but also for BAR as well as it was the bureau's support that made possible success in the development for commercialization of tilapia ice cream.

CLSU's tilapia ice cream had delighted the judges and thousands of participants during the Salon International de l'Agroalimentaire (SIAL) ASEAN Manila 2016 held on 30 May-2 June 2016 at the World Trade Center, Manila for which the university received a Gold Medal as Innovation World Winner Awardee. SIAL ASEAN Manila 2016 was participated in by 350 international exhibitors from 25 countries.

PHOTO:MEAQUINO

CLSU President Tereso Abella (3rd from left) and project team present the SIAL award to BAR Director Nicomedes Eleazar (4th from left) and BAR-Technology Commercialization Division Head Anthony Obligado (5th from left).

BAR, under its National Technology Commercialization Program, had supported the development of the technology and commercialization of tilapia ice cream and other tilapia-based products, such as tilapia cookies. Variants of the tilapia ice cream now include tilapia ice cream with tilapia praline, tilapia ice cream sans rival, and tilapia ice cream with tilapia cookies. The tilapia cookies are available as thin plain tilapia cookies, tilapia cookies with tomato jam, and tilapia hermits dipped in lemongrass-pandan chocolate.

The CLSU tilapia ice cream was featured in the SIAL Paris 2016 food exhibit held on October 2016 and will again be showcased in SIAL Canada 2017 in May 2017. ### ***(Ma. Eloisa H. Aquino)***

Technologies shared... from page 4

provides women with opportunities to earn even without the assistance of their husbands. In Guinobatan, Albay for example, a battered wife earned additional income from making macapuno muffins. With her consistent contribution to their family's budget, she is no longer abused by her husband resulting to improved family dynamics," said Diverlyn Sy Nabor, one of the farmer-attendees during the roll-out.

"We are overwhelmed by the insights shared during the activity and the appreciation for the utility and usefulness of TCoW. We are glad that TCoW also serves as a feedback mechanism to learn about the particular needs of the communities," Mr. Anthony Obligado, head of BAR's Technology Commercialization Division, shared. According to him, this exercise will be very useful for the Bureau in its R&D prioritization effort and also for researchers to also consider venturing into other researchable areas. Mr. Obligado added, "The TCoW roll-out also provides a good venue for technology generators and other institutions for networking and future collaboration."

UPLB Chancellor Fernando Sanchez, Jr., through Dr. Serlie Barroga-Jamias, UPLB Vice Chancellor for Community Affairs, conveyed UPLB's steadfast support for the TCoW project. She mentioned that, "UPLB supports the TCoW program and its goals because the best technologies will be all for nothing if our stakeholders are not informed about this knowledge. The TCoW can bridge the gap between the laboratory and the field. It can truly be instrumental in promoting inclusive agricultural growth benefitting the rural communities." Dr. Jamias added that the TCoW project would not only bring improvement in the livelihoods in the community, but also a boost in local practices, values and attitudes, sense of entrepreneurship, and appreciation for agriculture. ### ***(Ma. Eloisa H. Aquino)***

> **"The TCoW can bridge the gap between the laboratory and the field. It can truly be instrumental in promoting inclusive agricultural growth benefitting the rural communities."**

Mushroom cultivation and processing technologies featured in BAR seminars

(L-R) Mr. Pedro Oliver of DA-RFO-5 talks about mushroom production and cultivation in the Bicol region. On the other hand, Ms. Alma Caringal and Ms. Sheena Marie Arce of Southern Luzon State University–Tiaong Campus presents the health benefits of mushrooms and does a cooking demo on preparing mushroom dishes, respectively. PHOTOS: EJGESTUPA

To create awareness on the technologies generated from research and development (R&D) in the agri-fishery sector, the Department of Agriculture-Bureau of Agricultural Research (BAR), in collaboration with its research partners, regularly conducts in-house seminars.

For this month, seminars on the culture, cultivation, and processing technologies of mushroom were held at BAR on 23-24 February 2017. The event was attended by more than 600 participants, a notable increase of 923 percent as compared to previous in-house seminars. Due to the high number of participants, the activity was divided into four batches conducted in 2 consecutive days.

BAR Director, Dr. Nicomedes P. Eleazar, gave the opening remarks and welcomed the resource speakers and partners who have continually supported the initiatives of the Bureau. "*Kasabay ng layunin na i-angat ang antas ng kabuhayan ng ating mga magsasaka at mangingisda sa tulong ng research and development, layunin ng BAR na mapahusay ang pagpapalaganap at pagtataguyod ng mga bagong pamamaraan at mga makabagong teknolohiya tungo sa higit na produktibo at masaganang pamumuhay*," he said.

Mr. Pedro F. Oliver, regional focal person on mushroom project of the DA-Regional Field Office-5, served as one of the resource persons. He presented the topic, "Mushroom Production and Cultivation in the Bicol Region," highlighting on the commodity's social, economic, and environmental benefits. According to Mr. Oliver, mushroom cultivation has four phases, namely: pure culture fresh mushroom, rapid multiplication (subcultures), spawn preparation, and planting for fruit production. He also discussed the important steps involved in each phase.

Mr. Oliver likewise recognized how mushroom farming can lead to the economic betterment of small farmers. "Aside from its nutritional and medicinal value, mushroom also serves as a means of generating employment and is a good cash crop too." He also mentioned about the country's efforts on establishing a "Mushroom Roadmap for the Philippine Industry" towards intensifying the production and utilization of mushroom in the country.

The other speaker was Ms. Alma J. Caringal, instructor from the Southern Luzon State University–Tiaong Campus. She presented the health benefits of mushrooms. "Eating mushroom helps in maintaining the right level of blood sugars, curing anemia, maintaining moods, providing energy, and resolving skin problems, among others", she said.

According to Ms. Caringal, edible mushroom is rich in vitamins and minerals. It contains essential amounts of zinc, iron, potassium, calcium, folic acid, niacin, and vitamins B1 (Thiamin), B2 (Riboflavin), B3 (Niacin), B5 (Pantothenic Acid), B12 (Cobalamin) and vitamin D. *Ergothioneine* and *benzaldehyde* are active

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BAR Director Nicomedes Eleazar (left) shares how BAR has been initiating efforts that will promote the technologies generated in R&D such as through BAR's regular in-house seminars, while BAR-Applied Communication Division Head Julia Lapitan (right) gives an overview of what to expect during the seminar on mushroom. PHOTOS: EJGESTUPA

BAR supports UE CAMANAVA study conference

PHOTOS: DLBATTAD

Attending the study conference are researchers, scientists, educators, and students from private and public institutions in Malaysia, Indonesia, Thailand, and the Philippines. In the activity, the Pampanga State University (right) presents BAR-supported projects on adlay and lotus.

The Bureau of the Agricultural Research (BAR) served as one of the co-conveners of the 3rd biennial CAMANAVA studies conference held by the University of the East–Caloocan on 3-5 February 2017, which was participated in by around 350 local and international researchers, scientists, educators, and students from private and public institutions in Malaysia, Indonesia, Thailand, and the Philippines.

Titled, "International Conference on Emerging Discourses and Issues in Sustainable Development," the three-day event targets to promote and advance sustainable development by bringing together key players and experts across disciplines, providing a venue for the exchange of ideas and research findings relevant to sustainable development.

Topics presented and discussed were in various disciplines such as agricultural science and technology, business and hospitality management, environmental science and management, engineering and technology, humanities and communication, natural sciences and mathematics, and social and behavioral sciences.

Two BAR-funded projects were presented by the Pampanga State Agricultural University (PSAU) during one of the concurrent sessions under the agricultural science and technology category. These projects, with titles, "Climate Change Responsive Lotus (*Nelumbo nucifera*) for Food and Wellness Products" and "Development of Food Products using *Adlay* (*Coix lacryma-jobi*) Grain at PSAU, Philippines," focus on harnessing the potentials of lotus and *adlay*, respectively. As reported in the conference, project results have demonstrated the benefits of added knowledge for the lotus growers and *adlay* farmers as this translates to higher income and, thus, better productivity.

Such agriculture-based research and development projects, along with the rest of the presentations from across disciplines, roused the interest and ignited the appreciation of the target participants, especially the students, when it comes to R&D as a whole.

Certainly, BAR recognizes the value of conducting such a conference because of the consistently growing need of the public for innovations, solutions, and technologies towards a harmonized and sustainable economy, a safe and stable environment, and a progressive society.

In the message given by Dr. Zosimo M. Battad, chancellor of the UE-Caloocan campus, he regards scientists as real heroes as they generate meaningful researches and innovations to build and ensure a more resilient, sustainable culture especially for the future generations. He encouraged everyone to "share, go beyond research and be real life educators for the fulfillment of a sustainable community."

Highlighting the 'Global Mega Challenges' that deal with issues on climate change, land degradation, loss of biodiversity, food, water, and energy crises, and population explosion, Dr. William D. Dar–who served as the keynote speaker–discussed management practices and technologies relevant to addressing these issues with emphasis on reinforcing a competitive and market-oriented agriculture including empowerment and institutional capacity development, infrastructure and logistics, climate change adaptation, and research and development, among others.

Dr. Dar, President of the *InangLupa* Movement and Strategic Adviser for Global Expansion of Prasad Seeds Private Limited, gave the presentation on the "Seventeen Sustainable Development Goals", in which he shared important strategies in accomplishing such goals through industry, innovation, and infrastructure; partnerships for climate action; and entrepreneurship that ensure added values for everyone along the value chain.

With the level of awareness raised coupled with the knowledge shared through dynamic conferences, BAR sees to it that information dissemination platforms such as this are assisted as these attract the younger generations to the value of and benefits that can be derived from agri-fishery R&D.

BAR supported this activity through its Scientific Publication Grant (SPG) that aims to support initiatives on the promotion and dissemination of knowledge and technology. ### ***(Daryl Lou A. Battad)***

BAR presents RDEAP in SUC–ACAP conference

Ms. Cynthia Remedios De Guia, assistant head of BAR-PDD, presents the RDEAP 2016-2022 which serves as BAR's reference document in planning, implementing, and evaluating R&D-related activities of the NaRDSAF member-institutions in the next medium term. PHOTO:MSVALDEABELLA

The Bureau of Agricultural Research (BAR) took the opportunity to attend the "Organizational Planning Conference of the State Universities and Colleges-Association of Colleges of Agriculture in the Philippines (SUC-ACAP)" held on 2-3 February 2017 at Aklan State University (ASU) in Banga, Aklan. On the invitation of the association, Ms. Cynthia Remedios De Guia, assistant head of BAR's Program Development Division (PDD), represented BAR Director Nicomedes P. Eleazar. She presented the "RDEAP 2016-2022" that was recently completed and updated with the help of the Bureau's R&D partners.

BAR, with its goal of providing a better life for Filipino farmers and fishers through the provision of support to the conduct of relevant and responsive research and development (R&D), recognizes the importance of continuously building and strengthening good working relationships with agri-fishery R&D institutions. The Bureau is very much aware that these institutions have the bigger task of, not only initiating the conceptualization and conduct of research projects, but also in ensuring that they are implemented for the optimum benefit of the sector. BAR, therefore, sees to it that the Bureau remains open and consultative with them, continuously informing and updating them on its priorities particularly when it comes to BAR's Research and Development and Extension Agenda and Programs (RDEAP) for agriculture and fisheries for the next medium term.

These institutions include the state universities and colleges (SUCs) who offer and underscore the study of agriculture and who often possess vital scientific expertise and knowledge. Along with the DA R&D-implementing national agencies and DA-regional field offices, these SUCs are BAR's partners in the conduct of projects and activities on agri-fishery RDE.

Ms. De Guia discussed how R&D proposals submitted to the Bureau for funding support are prioritized based on the agreements reached in the RDEAP prioritization workshop conducted in December 2016. The RDEAP is the Bureau's reference document in planning, implementing, and evaluating R&D activities of the members of the National Research & Development System for Agriculture and Fisheries (NaRDSAF). It informs the entire agri-fishery R&D community of what BAR's priorities are in providing support to R&D proposals. Mainly anchored to the goals and thrusts of the DA, BAR's RDEAP underwent an exhaustive and comprehensive review and updating in the first semester of 2016 and was packaged towards the end of the same year.

Taking the cue from the event's theme, "Agri-Fishery Research and Development: Trends and Challenges Facing Educational Institutions in the Midst of Climate Change," Ms. De Guia, who also serves as one of BAR's Climate Change (CC) RDE focal persons, presented BAR's initiatives vis-à-vis the DA-Climate Change program. Much like the RDEAP, the "CC RDEAP" serves as the guide in the identification and conduct of RDE activities that strategically target issues related to climate change. Published in 2016, the CC RDEAP has three major components: program logical framework, sectoral RDE agenda, and mainstreaming checklist.

An open forum took place after BAR's presentation. The questions raised concerned on-going BAR-supported CC projects, BAR's support to R&D facilities establishment and development, and online access to BAR documents.

Leading the discussions in the conference were SUC presidents: Dr. Danilo Abayon of ASU, Dr. Georgina Bordado of Central Bicol State University of Agriculture (CBSUA), Dr. Maria Luisa Soliven of Central Mindanao University (CMU), Dr. Francisco Lopez of Ilocos Sur Polytechnic State College (ISPSC), Dr. Honorio Soriano Jr. of Pampanga State University of Agriculture (PSAU), and Dr. Gregorio Rodis of Bataan Peninsula State University (BPSU). ### ***(Mara Shyn M. Valdeabella)***

Participants of the SUC-ACAP planning conference PHOTO COURTESY OF MSVALDEABELLA

BSU recommends snap bean, garden pea varieties for organic production

After a series of testing and seed multiplication of potential varieties of bush and pole snap beans, and garden pea for organic vegetable production, the Benguet State University (BSU) has identified the varieties for fresh pod production that are technically feasible, economically viable, and socially acceptable.

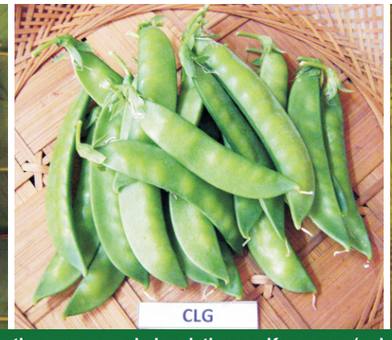
For pole snap beans, the recommended varieties include *Kapangan*, *Mabunga*, *Itogon*, *Wangal*, *Kibungan*, *Tublay*, *Tuba*, and *Alno*; while *Sablan*, *Bokod*, *Cali*, *Contender*, and *Landmark* for bush snap beans. For garden pea, the varieties *Betag*, *Trinidad*, *Boniero*, *CGP 59*, and *Chinese Light Green* are recommended.

According to the project leader, Dr. Leoncia L. Tandang, "The characteristics of these selected and improved varieties were tested and the crops were proven to be suited to organic production systems in widely-separate provinces where bush and pole snap beans, and garden pea are being commercially-grown. These include Benguet, Nueva Vizcaya, Batangas, Quezon, Negros Occidental, and Bukidnon. Hence, they are now recommended for organic production throughout the country." Generally, the recommended varieties possess the characteristics of being high-yielding, tolerant to major pests and diseases, with good eating and postharvest qualities, and profitable which are preferred by the farmers and consumers alike.

Such varieties of bush and pole snap beans and garden pea were initially developed and selected in a joint breeding program of BSU and the University of the Philippines Los Baños (UPLB)-Institute of Plant Breeding at BSU's Highland Crops Research Station. After having been identified as suitable for organic production in Benguet, these varieties were tested and seed multiplied as part of the project, "Pilot Testing and Seed Multiplication of Potential Varieties of Snap Beans *(Phaseolus vulgaris* L.) and Garden Pea (*Pisum sativum* L.) Under Organic Production System in the Philippines." Primarily, the project is aimed at developing new and improved varieties to meet the dynamic demands of the farmers and other clienteles. "More importantly, we are hoping to support our vegetable industry by providing the country with year-round supply of organically-grown varieties of snap beans and garden peas which are high-yielding, clean, and safe," Dr. Tandang said.

The project was supported by the Bureau of Agricultural Research, and carried out by BSU in collaboration with the Department of Agriculture-Regional Field Office (DA-RFO) 2's Nueva Vizcaya Experiment Station, DA-RFO 4A's Quezon Agricultural Research and Experiment Station and Lipa Agricultural Research and Experiment Station, DA-RFO 10's Northern Mindanao Agricultural Crops and Livestock Research Complex, UPLB-La Granja Research and Training Station, and farmer-partners in the localities covered by the project. ### ***(Anne Camille B. Brion)***

For more information, contact:
Dr. Leoncia L. Tandang
Professor/Project Leader
Benguet State University
La Trinidad, Benguet
Telefax: 074-422-2439
Mobile No.:0917-808-1639
Email: *onie_tandang@yahoo.com.ph*



(L-R) Among the recommended varieties are Kapangan (pole snap bean), CLG (garden pea) and Cali/Hab 19 (bush snap bean). PHOTOS COURTESY OF LTANDANG/BSU

BAR director opens... from page 2

Jr., delivered the keynote address. Dr. Eliseo Ponce, former director of BAR, was the forum's plenary speaker and discussed "The Philippine ARD and ASEAN Integration: Status, Challenges, and Opportunities." As part of the presentation, Dr. Ponce presented "a framework of partnerships in ARD among ASEAN countries to fully harness ARD in meeting the collective goals of agricultural development in the ASEAN."

Eight papers from the Philippines and 6 from the ASEAN member-countries, Cambodia, Vietnam, Indonesia, Lao PDR, Malaysia, and Thailand were presented. The topics included flood risk reduction, insect pest management, climate change impacts, rice productivity, and agri-mechanization, among others. ### ***(Mara Shyn M. Valdeabella)***

DA-Cagayan Valley to build organic agri R&D center in Nueva Vizcaya

Employees and staff of DA-RFO 2 and NVES attend the ground-breaking ceremony of soon-to-rise OA R&D center of DA-Cagayan Valley. PHOTO COURTESY OF DA-RFO 2

In support to the advocacy, promotion, and adoption of organic agriculture embodied in Republic Act 10068 (Organic Agriculture Act of 2010), and to intensify the adoption of organic farming practices in the country, particularly in Cagayan Valley, the Department of Agriculture-Regional Field Office 2 is set to build an "Organic Agriculture (OA) Research and Development (R&D) Center" in its Nueva Vizcaya Experiment Station (NVES) located in Brgy. Villaros, Bagabag, Nueva Vizcaya.

A ground-breaking ceremony was held at the proposed site on November 2016 which was officiated by Ms. Lovelyn A. Gaspar, OIC-chief of DA-RFO 2's Research Division; and Ms. Celerina T. Miranda, station manager of NVES. In attendance were officers and staff from the DA-RFO 2 and NVES.

The proposed OA center, which is being supported and funded by the Bureau of Agricultural Research (BAR) under its Institutional Development Grant (IDG), will provide a technologically advanced facility that will serve as a *one-stop-shop* center focusing on organic agriculture in the region. The facility will showcase various organic agriculture technologies on crop and livestock production, specifically, organically-grown rice, corn, vegetables and fruits, native chicken, and native pigs. The center will also facilitate the generation, development, promotion, and commercialization of viable organic farming technologies and products.

The NVES will manage the center, having acquired a third-party certification issued by the Organic Certification Center of the Philippines (OCCP) in 2015 for organic products such as native pig, wild pig, native chicken, as well as upland rice seeds and assorted high-value vegetable seeds.

According to Ms. Gaspar, the lead project proponent, aside from featuring organically-grown produce, the center will also serve as the region's hub for cultural management practices, various research and development undertakings, and training and outreach activities, among others.

Once fully operational by 2018, the center will cater to the local farmers, fishers, researchers, academe, entrepreneurs, government and private organizations, and provincial and municipal local government units.

Organic agriculture is one of the banner programs of the Department of Agriculture. BAR's IDG, which supports this and the other DA banner programs, caters to the growing development needs by making possible more responsive delivery of services and technological interventions in the agri-fishery sector. ### ***(Jonabelle T. Infante/DA-RFO 2 and Patrick Raymund A. Lesaca)***

Mushroom cultivation...from page 6

PHOTO:EJGESTUPA

Some of the mushroom recipes presented in the seminar include mushroom chili appetizer (left) and mushroom brownies (right).

compounds which are found only in mushrooms and have significant antibacterial activity and unique antioxidant properties that protect cells in the body.

She also explained that unlike vegetables and fruits, mushrooms have the ability to keep and concentrate vitamins and minerals even after various processing methods. This is the reason why mushrooms have a good market niche in the market with the now health-wise consumer populace.

Meanwhile, another resource person from SLSU-Tiaong, Ms. Sheena Marie C. Arce, did cooking demonstrations and procedures on preparing mushroom dishes. She showed cooking techniques for turning mushroom into various products like mushroom chocolate brownies and mushroom chocolate appetizer. The cost-and-return analysis for each product was also presented.

The conduct of the seminars was made possible through BAR's Applied Communication Division. Also during the activity, IEC materials such as crop calendars and other technology brochures were distributed to the seminar participants, the production of which was made possible through the collaboration between BAR and the Asian Food and Agriculture Cooperation Initiative (AFACI). ### ***(Leoveliza C. Fontanil)***

Meeting among BAR, AMAS, PCHRD held for complementation activities

The Bureau of Agricultural Research (BAR), through its Technology Commercialization Division (TCD) staff, met with officials from the Agribusiness and Marketing Assistance Service (AMAS) of the Department of Agriculture (DA) and the Philippine Council for Health Research and Development (PCHRD) of the Department of Science and Technology (DOST) for possible complementation activities on separate occasions in February 2017.

TCD Head Anthony B. Obligado and staff met with Ms. Rowena S. Genete, chief of the AMAS-Agribusiness and Promotion Division (APD), and her staff. Both AMAS and BAR give specific attention to strengthening market-driven approaches, thereby benefitting all stakeholders of the value chain that would enhance the production, distribution, and dissemination of agribusiness products and services both locally and abroad.

As the mandated research arm of the DA, BAR has been supporting researches and technologies developed by R&D institutions in the country to address both production and profitability concerns. As such, BAR recognizes the strong partnership with and significant role of other agencies in developing and generating new technologies for farmers and fisherfolk as well their promotion.

Mr. Anthony Obligado (2nd from left), head of BAR-TCD, and staff meet with Ms. Rowena S. Genete (4th from right), chief of the AMAS-APD, who is also with her staff, to discuss the activities being undertaken by BAR under NTCP and the AMAS' functions. PHOTO COURTESY OF MEAQUINO

The bureau's National Technology Commercialization Program (NTCP), one of its flagship programs, focuses on upscaling technologies generated from research and its activities including technology transfer, promotion, adoption, utilization, and commercialization. The TCD serves as the principal coordinating unit of BAR that handles all projects funded and coordinated under the NTCP. The division also facilitates the accomplishment of its objectives, specifically in areas of commercializing, marketing and linkaging to potential investors.

With the vast technologies on hand, it is deemed important to be able to promote them in order to maximize their potentials and reach its targeted consumers or end-users. BAR, through NTCP, facilitates activities to promote and provide venue for market linkages. These include the conduct of the Agriculture and Fisheries Technology Forum and Product Exhibition, and attendance to other exhibitions/technology forums organized by other agencies. Also BAR, through the Applied Communication Division, conducts regular in-house seminar series to be able to disseminate technologies to farmers, fisherfolk, and other clientele.

PHOTO:MEAQUINO

Representatives from BAR-Technology Commercialization Division meet with staff from the Philippine Council for Health Research and Development of the DOST for possible complementation activities.

On the other hand, AMAS is mandated to "provide a unified market development and investment assistance and promotion services mechanism to the Department's external stakeholders in support of market efficiency and food security agenda of the government." It also conducts enterprise development seminars to showcase generated technologies supported by the Department. As discussed by Ms. Ganete, APD in particular, "facilitates innovative business ventures, disseminates information on agribusiness opportunities, and organizes investment fora and assists in inbound and outbound investment missions."

Meanwhile, among those discussed during the BAR-PCHRD meeting was on one of PCHRD's priorities on functional foods which involves researches on the health benefits and safety assessment of food or food components in reducing risk for disease occurrence, specifically lifestyle related diseases such as cardiovascular diseases, diabetes, and cancer. Also, discussed was the *Tuklas Lunas* program that entails: (1) capacity building in drug

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