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SUSTAINING THE REGIONAL FOOD BASKETS

BAR R&D Digest is the official quarterly publication of the Department of Agriculture-Bureau of Agricultural Research (DA-BAR). A staff bureau of DA, it was established to lead and coordinate the agriculture and fisheries research and development (R&D) in the country. Specifically, BAR is tasked to consolidate, strengthen, and develop the R&D system to improve its effectiveness and efficiency by ensuring customer satisfaction and continuous improvement through work excellence, teamwork and networking, accountability and innovation.

This publication contains articles on the latest technologies, research results, updates, and breakthroughs in agriculture and fisheries R&D based from the studies and researches conducted by the member-institutions of National Research & Development System for Agriculture and Fisheries (NaRDSAF).

BAR R&D Digest welcomes comments and suggestions from readers.

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R&D Notes

Sustaining the regional food baskets

by: DR. NICOMEDES P. ELEAZAR, CESO IV

Different parts of the country possess widely differing advantages for the production of agricultural and fisheries food crops, food products, and technologies—these of course depend on the agro-climatic condition, soil and water quality, farmers' practices, among others.

By and large, farmers and fishers produce the country's food. Meanwhile, technology developers, both from the public and private sectors, are the ones producing and developing the appropriate farming and fishing technologies that will complement the food production process.

The Department of Agriculture (DA), in the whole range of food production, has prompted the call to the entire regions to produce and promote their food products, and to utilize or avail of such technologies that will spur food production of which the optimum goal is to contribute to food security and sustainability. This interplay on the food production cycle must also be complemented by technologies driven by research and development (R&D).

While it is true that farmers and fishers produce meals for the table, the significant role of the DA-Regional Field Offices (RFOs) is likewise crucial in the inventory of food. Indicator like the direct intervention of government through R&D can

also be considered as a pivotal means to achieve agri-fishery growth.

The Bureau of Agricultural Research (BAR), the R&D arm of DA, believes that the regional offices can champion their crops and technologies, and thus can also be considered regional “food baskets”.

In this issue of the **BAR R&D Digest**, we see to it that the country’s top two food staples, rice and corn are given attention. On rice, a comprehensive decision-making tool, Rice Crop Manager (RCM), will provide farmers with crop and nutrient management recommendations customized to the farming conditions. A testament on rice farmers’ increase on yield and income by as much as Php4,000 per hectare

per cropping had been some of the experiences of farmers from ARMM. A BAR-funded project on the development of improved white corn varieties in the Caraga region has been identified and known as *IPB Var8* and *Northland White*, which produced an average yield of 3.82 and 3.18 tons per hectare, respectively. Furthermore, these varieties have 85 and 51 percent yield advantages over the traditional varieties, respectively.

A cacao farmer in Compostela Valley Province, Region 11 shared his success story since he joined the DA-led Cacao Integrated R&D Rehabilitation Program, which later gave him the competitive advantages of producing cacao and earning

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Researcher

by: VICTORIANO B. GUIAM

Time and again, it has been shown that the progress in RDE lies in the hands of the people who identify and conduct needed researches. For the Department of Agriculture (DA) management and the Bureau of Agricultural Research (BAR), their roles are anchored largely in providing strategic directions and resources required in carrying out research.

In telling the story of technological developments that can improve the livelihood and incomes of farm families and rural communities, who could be better at this than the researchers themselves? By acting as the “sellers” of technology, they “put their money where their mouth is”, so to speak, as they themselves must be full in the belief that the technologies that they developed really work.

Researchers getting involved in the dissemination and training on new farm technologies has been an ongoing thing in various forms ever since agricultural R&D became an organized activity. A feature common to all kinds of agricultural experimentation

ers as movers of technology

is demonstration. With a well designed research, there is a close connection between what is being demonstrated and the public that is the target of the demonstration. The demonstration of new and appropriate technologies is one task area of the DA-Regional Field Offices (DA-RFOs), BFAR Regional Offices, and of the state universities and colleges (SUCs) under their research/outreach function.

In the demonstration activities of BAR-supported research, such as those under the Community Participatory Action Research (CPAR) and the National Technology Commercialization

Program (NTCP), the regional agricultural extension apparatus has been a close ally. Conversely, in many of the different extension approaches to promote technology adoption developed through the years (e.g., commodity approach, training-and-visit approach, participatory approach, farming systems approach, and institutional approach), researchers have been major participants, often playing lead roles.

With the extension function now in the local government units (LGUs), research staff members of the DA-RFOs, other DA agencies and

SUCs are frequently relied on to provide the technology messages in their outreach activities for their constituents. In developing their respective “One Town, One Product” (OTOP) commodities, researchers from DA and SUCs frequently backstop the LGUs with technical know-how. In the rebuilding of trust in at least one war-torn area in Mindanao, extension work that centers on the introduction of technologies is among the first interventions for local poverty alleviation and economic stabilization being carried out.

At BAR, in its monthly

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seminar series, researchers behind the development of the latest and most relevant technologies are often tapped to present their findings before prospective users that can include farmers, would-be entrepreneurs, students, and other researchers. They are also invited to speak in other platforms such as the annual BAR National Technology Forum and the yearly AgriLink agribusiness exhibition and seminars.

It can be said that it is the successful dissemination and utilization of research-generated information that ultimately justifies research budgets. R&D is an investment. And as with any investment, the investor (the public) would like to see good returns coming back to him. With our service-oriented researchers, we will continue seeing them connecting with the end-users in disseminating the knowledge and information that they developed as a way of giving back to the public on its support. ###

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more for his family's needs.

The agency also funded a pili R&D project in the Bicol region, which according to the project proponents, efforts have already been made in the direction of coming up with a long-term plan on integrated R&D and extension program including propagation of quality pili varieties with good horticultural traits. Also featured in this issue is the association of mushroom growers in the province of Tarlac in Region 3, which has been instrumental in piloting a community-level mushroom production. The association continues to become a model mushroom farm and shares some growing technique for people wanting to start up their own mushroom production.

See how a beekeeping is booming in the heart of the city in the province of Batangas. The project was implemented in partnership with DA-RFO 4A -Southern Tagalog Integrated

Agricultural Research Center and the City Agriculturist Office of Lipa in collaboration with University of the Philippines Los Baños-Bee Program.

Finally, another BAR funded project on rabbit raising has been seen as an additional source of income of farmers in the highlands of the Cordilleras. The Rabbit and Vermiculture Project established at the DA-Cordillera Integrated Agricultural Research Center started small with two bucks and 10 female breeders.

These and more are some of the bureau's supported endeavors and R&D interventions in support to the call for food security in collaboration with the DA-RFOs, and in partnership with some of the R&D stakeholders.

Take note also that this particular issue of the **BAR R&D Digest** features contributions from our information officers from DA-RFOs highlighting the champion products in their regions. ###

Raising rabbit for meat and vermiculture as profitable backyard enterprise



by: DR. MAGDALENA T. WANAWAN, DA-RFO CAR

Rabbit-raising offers many potential benefits. It can provide additional income and manure for healthful crops. Rabbit production requires minimal labor which can be shared among family members. Moreover, rabbits are therapeutic since they are docile and make good pets.

For those who eat rabbits, the United States Department of Agriculture (USDA), found that rabbit meat is high in protein and low in fat and cholesterol. The literature claimed that some physicians recommend rabbit meat to patients with coronary conditions because it has lower

cholesterol as compared to other meat. According to the USDA and A&M University, as cited by Dean's Rabbits (2015), rabbit meat has a lower percent of fat than chicken, turkey, beef, lamb or pork. As for calories, rabbit meat has a lower value than pork, lamb and beef.

Another benefit from growing rabbits is the production of organic fertilizer out of its manure. The manure from rabbits makes excellent compost as it is rich in organic matter and nutrients. It is very helpful in improving the life cycle of the beneficial microorganisms in the soil.

Although the nutritional content of different animal manures may vary per location, most literature cited that rabbit manure outshines the others in terms of some major nutrient elements. Rise and Shine Rabbitry (2012) posted the following N – P – K (Nitrogen-Phosphorus-Potassium) values of rabbit manure as compared to others, rabbit: N- 2.4 P- 1.4 K- .60; chicken: N- 1.1 P-.80 K- .50; sheep: N- .70 P- .30 K-.60; horse: N- .70 P-.30 K-.60; steer: N- .70 P-.30 K-.40; and dairy cow: N- .25 P-.15 K-.25.

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In addition, rabbit manure is packed with micro-nutrients and beneficial trace elements such as calcium, magnesium, boron, zinc, manganese, sulfur, copper, cobalt, and others.

From cast to cash

Vermiculture is an ideal match for rabbit production since worm bins can be placed right under the rabbit hutches to catch the rabbit manure thereby maximizing space. Worms and their casts could be another source of cash income or casts could be utilized to produce organic food.

Kitchen trimmings and garden by-products can be added to the rabbit manure as worm food. Garden by-products could be recycled as feed for the rabbits. This way, the biodegradable solid waste of the household would be better managed.

In the Philippines, one household of five could generate 2.5 kilos of waste per day or 58 kilos a month of which 75 percent is biodegradable. The bulk of the biodegradable waste is vegetable trimmings and fruit peelings. Such refuse could nourish the rabbits and the worms which, eventually, will produce nutritious manure

and compost to feed crops.

The “Rabbit and Vermiculture Project” established at the Cordillera Integrated Agricultural Research Center (CIARC) started small with two bucks and 10 female breeders. These were placed in a long rabbit hutch with six compartments and the does were bred when they were 7-8 months old.

Garden refuse (non-marketable products) including chayote fruits and leaves, camote leaves, and other leafy greens were given as supplemental food to the animals.

Meanwhile, the vermibeds were installed under the rabbit hutches and filled with beddings such as chopped grasses/weeds and shredded papers. Cow manure and kitchen scraps were also given as food to the worms.

To date, there are four rabbit hutches with corresponding vermi bins that produce an average of 140 sacks of vermicast a year. The vermicast was used for the container gardens and organic vegetables in the station.

With the addition of cow manure to the vermibeds, a

worm bin of 1 x 6 meters under a rabbit hutch can produce about three sacks of organic fertilizer per month. This is a source of premium organic fertilizer for the producers’ crops or it can serve as an additional source of income aside from the rabbit proceeds.

###

References:

Dean’s Rabbits. (2015). Rabbit Facts. Retrieved from <http://bit.ly/2r8qX7i>
Rise and Shine Rabbitry. (2012). The Benefits and Uses of Rabbit Manure. Retrieved from <http://bit.ly/2roxR1p>

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Sustaining income through community-based mushroom production

by: VERONICA P. MANGUNE, DA-RFO 3 | photos courtesy of DA-RFO 3

An association composed of 16 mushroom growers in Brgy. Don Ramon, Anao, Tarlac, the Anao Mushroom Growers' Association (AMGA) has been instrumental in the piloting of community-level mushroom production, and continues to become a model farm of people coming from different parts of the country wanting to start up

their own mushroom production. The association's initiatives on mushroom production provided a reliable source of high-quality mushroom fruiting bags and fresh fruits, thus giving a sustainable source of income among its members.

It all started when the association became cooperators of the "Community-based

Mushroom Production (CBMP)" project led by Dr. Emily A. Soriano of the Department of Agriculture–Regional Field Office (DA-RFO) 3. With funding support from the Bureau of Agricultural Research (BAR), the project aimed to develop a protocol for establishing community-level mushroom production,

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thus producing five modules on the know-hows of mushroom production and processing.

Ms. Estrella Jacinto, head of the Anao Mushroom Growers' Association, said that they have seen the potential of mushroom production as a business enterprise, and how it became a long-term source of extra income since the day the technology on mushroom was introduced to them. True enough, as it has been helping the households of both members and even non-members (e.g. students) of the association. From time to time, some of the non-members help in the production of bags and planting of spawn grains. Non-members will be paid Php 2/bag produced, and an additional Php 1 for every bag planted with spawn grains. This encourages members and helpers to produce more and reach a quota of 250 bags per day. Fruiting bags are sold at Php 25 each, while fresh mushroom fruits are sold at Php 150/kilo.

Unlike other mushroom producers who only purchase bags and wait for the fruits to flush, the association are producing their own mushroom tissue cultures and spawn grains to be planted in fruiting bags, and that is despite the highly-technical processes involved. This only goes to show the association's willingness to become independent and sustainable mushroom growers.

Ms. Jacinto, also the barangay captain of Brgy. Don Ramon, could not help but share how mushroom production helped their barangay. With majority of its members being housewives, the association was able to empower women by

giving them an additional source of income which they use to pay the bills and the school fees of their children.

Like in any other agricultural production, the association likewise encountered challenges along the way. Ms. Jacinto shared how difficult it was for them at the start, when they were still familiarizing themselves with the process of tissue culture and spawn grain production. A lot of their bags have been contaminated since working under aseptic conditions was very new to them. One thing she learned is to not get easily discouraged even when challenges arise.

"Kung halimbawa, gagawa kami ng isang salang ng bags tapos tataniman namin, tapos masisira, hindi kami na-ooffend basta itinutuloy lang namin. Nakikita namin 'yung problema, kami rin ang nakagagawa ng solusyon. Halimbawa hindi tumubo, susubok kami ng ibang paraan. Pero humihingi pa din kami ng gabay mula kay Maám Emily," she shared.

When asked about the future plans of the association, Ms. Jacinto said that they would very much like to increase their production, and to try producing other mushroom varieties as well. As for her advice to other people who would want to venture into mushroom production, *"Kapag tuluy-tuloy 'yung production mo, talagang kikita ka. Kailangan talaga ng tiyaga despite the challenges. Sana marami kaming ma-encourage na mga tao, dahil po itong pag-mumushroom, wala pong kapital na malaki na kailangan sa pag-uumpisa, tiyaga lang po talaga ang kailangan dito."*

Aside from funding the CBMP project, BAR also helped in promoting the association's story of success through a segment titled, "BAR-CLIARC Mushroom Production (Parts 1 and 2)," which was released in collaboration with PTV 4's Mag-Agri Tayo sometime in July 2014. Shown in the video were the how-to's of mushroom production featuring the association. The video has generated a significant number of views with the first part having 50,361 views, and the second having 39,413 views. This exposure prompted people, even from the other regions, to visit and buy the association's mushroom products.

The efforts of DA-RFO 3 have gone a long way in helping not only associations, but also individuals by encouraging them to go into mushroom production and providing the needed technical assistance through free trainings and consultations both on-station and on-site. These were made possible through the Mushroom Technology and Development Center located in Tarlac. The facility was built in 2014 and was funded through BAR's Institutional Development Grant. It has been assisting and reaching out to communities nationwide – with the hope of establishing more mushroom producers who would persist like the Anao Mushroom Growers' Association. ###

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“Kapag tuluy-tuloy ‘yung production mo, talagang kikita ka. Kailangan talaga ng tiyaga despite the challenges. Sana marami kaming ma-encourage na mga tao, dahil po itong pag-mumushroom, wala pong kapital na malaki na kailangan sa pag-uumpisa, tiyaga lang po talaga ang kailangan dito.”



Urbanization is taking place in Lipa City. Shopping malls, fast food restaurants, commercial banks, industrial parks are surfacing across the city. Still, the residents of Lipa chose to stick to their roots. Farming remains the primary source of livelihood in the city. Smallscale farmers grow vegetables and corn while those who have access to bigger pieces of land grow coffee and fruit trees. Amid the proliferating subdivisions, poultry farms, piggeries, dairy farms, and farm ranches still exist in this fast-paced cityscape made diverse by a thriving agriculture industry.

Lipa City puts itself in a strategic position to become a hub for profitable agribusiness ventures.

One of the more mature profit-oriented and well-sustained agribusiness ventures that grew out of Lipa City is beekeeping.

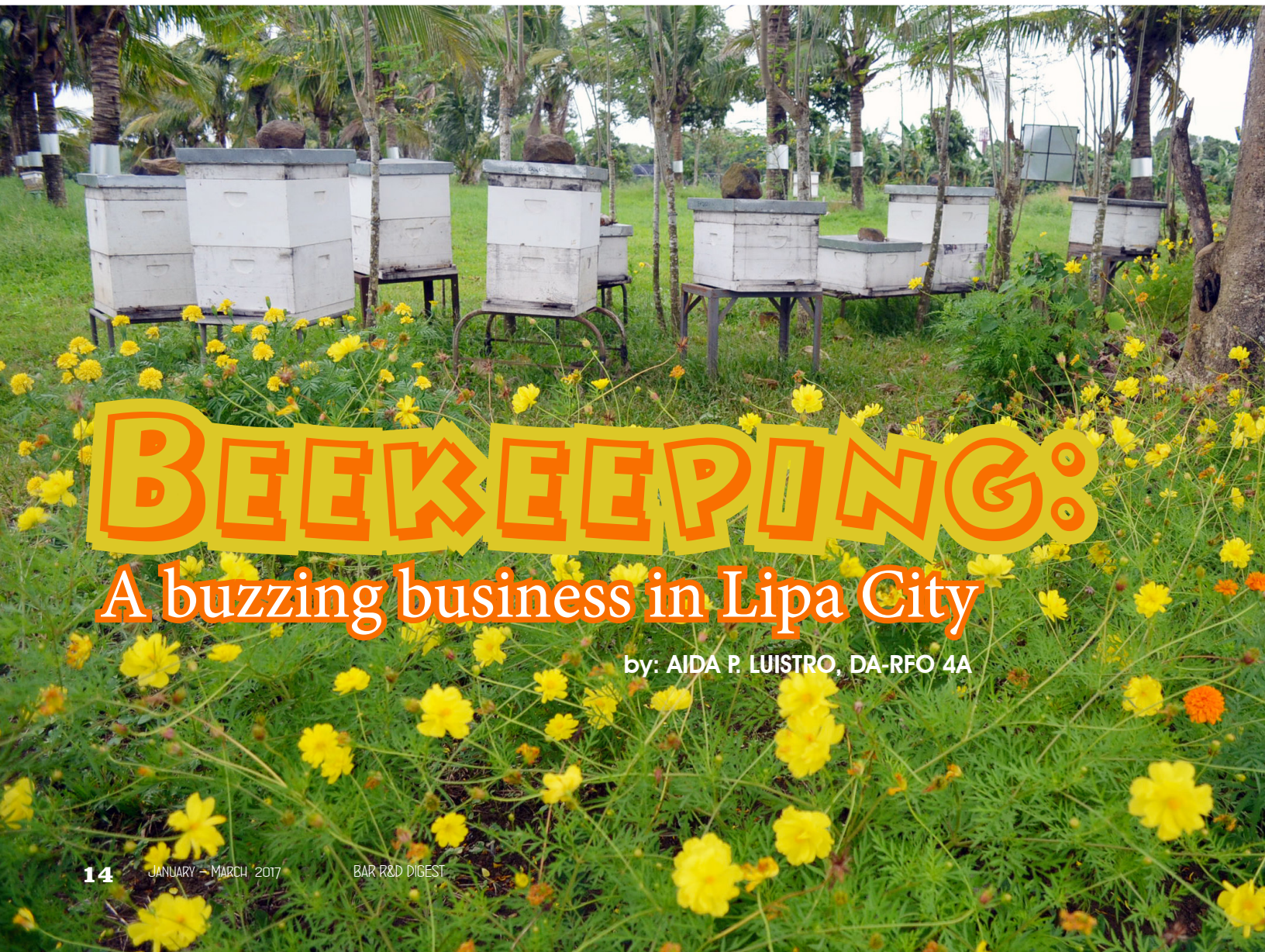
Mr. Porferio Olan started way back in 1960's when a priest, Father Lipat, brought European bee colonies in the seminary. "Naging driver ako ni Father kaya natutuhan ko ang pag-aalaga ng laywan," as told by Mr. Olan.

Now at age of 84, Ka Periong as fondly called by his fellow beekeepers, is still engaged in bee farming. He keeps his bees

at the backyard and whenever he harvests honey, he pastures them in other places where flowers are abundant. Over the years, Ka Periong has mastered the timing of when to allow his bees to migrate and to what area is best for them to go.

Thanks to beekeeping, Ka Periong was able to put his kids through college. One of them is currently working in the United States as a Certified Public Accountant. Ka Periong's success in beekeeping inspires others as he also shares his golden thoughts on how to do beekeeping.

Mr. Edgar del Rio of



BEEKEEPING:

A buzzing business in Lipa City

by: AIDA P. LUISTRO, DA-RFO 4A

Brgy. Bulacnin, Lipa City is also a veteran beekeeper responsible for pioneering the practice in his baranggay. Unlike Ka Periong, Ka Edgar farms native bee or “laywan.” This honeybee species is smaller compared to the European bee. “Sinubukan ko na hulihin ang mga laywan at ikinulong ko sa kahon. Mula noon pinag-aralan ko na ang mga pamamaraan kung paano sila maalagaan at makakakuha ng maraming honey,” said Ka Edgar. Ka Edgar’s keeps his bee colonies in his backyard and sells the honey in a store which he established in front of his house. Today, numerous native bee farms and

bee products outlets can be found along the road of Brgy. Bulacnin, thanks to Ka Edgar’s initiative of sharing beekeeping know-how in his community.

Both Ka Periong and Ka Edgar are active members of the Lipa Beekeepers Marketing Cooperative (LBMC) which was organized through the Technology Commercialization Project funded by the DA-Bureau of Agricultural Research (DA-BAR). This project was implemented in partnership with the DA Region IV- Southern Tagalog Integrated Agricultural Research Center (STIARC) and the City Agriculturist Office of Lipa with the cooperation of the University of the Philippines Los Baños (UPLB) – Bee Program. LBMC was officially

registered at the Cooperative Development Authority in June 2015 with 25 members that have grown since then to a total of 40 registered members. Mr. Jose Vicente Tarnate is the current chairman of the cooperative. The project helped provide the cooperative with processing equipment such as honey extractor and wax melter. Members were also given trainings and technical assistance on beekeeping, bee product processing, and cooperative management.

LBMC is composed of local beekeepers who farm different species of bees, a majority of them, includes farming European honeybee (*Apis mellifera*) while some are venturing into native

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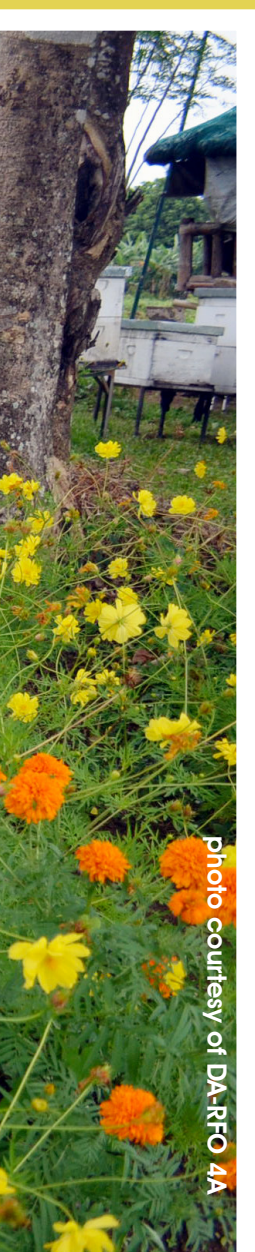


photo courtesy of DA-RFO 4A



photo by: Plesaca

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honeybee (*Apis cerana*) and stingless bee (*Tetragonula spp.*) or “lukot.” The cooperative is also responsible in the processing and marketing of the members’ products (honey, wax, propolis, pollen, honey cider, vinegar, soap, etc.) and in facilitating the procurement of beekeeping materials and supplies for its members. Likewise, LBMC coordinates training activities and technical assistance which are extended to its members.

For training activities on beekeeping, long-time LBMC members are tapped by the DA-STIARC and Agricultural Training Institute (ATI) to give lectures and hands-on demonstrations. The cooperative also hosts educational tours of these trainings.

LBMC has also put up an apiary-restaurant. This is part of the cooperative’s plan of establishing a bee farm where innovations on apiculture are being showcased to members and visitors. Sitting in the middle of this bee farm, owned by LBMC Secretary Joel Katigbak, is an ancestral home that also serves as a restaurant. “The Beehive Farm and Kitchen” is the original apiary-restaurant in Batangas that serves American cuisine infused with honey.

LBMC, with DA-STIARC and Lipa City Agriculturist Office, continues to promote beekeeping and advocate in saving the bees and other pollinators through pesticide-free farming. In the recently concluded Honey Fair held at SM Lipa City, LBMC in partnership with SM introduced beekeeping to the greater public. This event served as a venue to exhibit the importance of bees in food production and preserve

biodiversity and balanced ecosystem.

According to Ms. Cecil de Jesus, LBMC cooperative manager, “*mahalagang maipakita natin na masigla ang beekeeping industry dito sa Lipa upang mapalaganap pa ang pangangalaga ng ating kapaligiran.*” ###

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BICOL'S PILI NUT

soars as profitable commodity

THROUGH R&D

by: MABELLE ROA-ILAN, DA-RFO 5

There is a reason for the Bicolanos to be excited as opportunities arise for one of their champion commodities, pili (*Canarium ovatum* Engl.).

Pili tree is dubbed as the “tree of hope” due to its many uses and almost all its parts can be used for various purposes, food, medicine, and industrial.

Bicol has the largest producer of pili in the country with an estimated share of 85 percent of the domestic production or 6,258 tons, of which the bulk is produced by its four provinces – Sorsogon, Albay, Camarines Sur, and Catanduanes.

Being an indigenous crop of the Bicol region, pili gained fame as a popular snacks and *pasalubong* for the locals especially foreign tourists visiting the region. Seeing that there is a demand not only in the domestic market but also in the international arena, the Department of Agriculture-Regional Field Office 5 (DA-RFO 5) poured its investments in research and development (R&D) for the improvement of pili’s production, postharvest, processing and other value-adding activities.

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Pili R&D milestones

In 1991, pili was hailed as one of the banner commodities of the region. Various development programs were initiated to focus on the commercialization and modernization of pili production,

postharvest activities and marketing initiatives. Efforts had been done to come up with a long-term plan, and to establish a dedicated pili RDE program. These actions are necessary to ensure that the country will retain its position as the main supplier of pili in the world market.

According to DA-RFO 5 Research Division Chief Luz Marcelino, the agenda and program for pili R&D activities in the next 20 years will zero in on:

- 1) massive

- 2) propagation of the eight pili varieties with good horticultural traits, namely: the *Magnaye*, *Orolfo*, *Laysa*, *Magayon*, *Lanuza*, *Mayon1*, *Mayon2*, and *Orbase*;
- 3) establishment of scion groves to meet the inadequate supply of quality planting materials;
- 4) establishment of nurseries;
- 5) culture and integrated pest management to address low yield and poor quality of fruits;
- 6) development of new post-harvest techniques;
- 7) continuous collection and identification of promising varieties and cultivars;
- 8) accreditation of nurseries to ensure supply of quality National Seed Industry Council (NSIC) registered pili seedlings; and
- 9) technologies and varietal improvement and conservation.

As support to these agenda, the Bureau of Agricultural Research (BAR) funded several research studies on pili in the region. One of which is the study on the asexual method of propagation (e.g., grafting). Varietal and inter-varietal grafting was tested to determine the most feasible with economical and high percentage of successful graft. The *Laysa* and *Lanuza* varieties posted the highest survival rate at 85 percent. In terms of number of days to graft-take, *M. Orolfo* variety takes almost a month to graft-take while *Laysa*, *Lanuza*, and *Magayon* varieties take only 15 days.

Another study implemented was determining the "Grafting Ability of Pili through the use of IBA, Coconut Water and their Combinations and Influence of Dipping Time." It was found that the percentage of success in pili grafting was observed

with increasing coconut water concentration and increasing dipping time. The study obtained 95 percent success using 1,000 ppm concentration of coconut water with recorded dipping time of 25 minutes. First leaf appearance was observed at the 19th day after grafting.

Fertilizer studies on pili were also conducted to ensure healthy trees and more resistant to certain insect pest and disease. The study used the bearing and the non-bearing pili trees, which were provided with different fertilizer combinations of inorganic and organic fertilizers. Results showed that the pili trees exhibited uniform vegetative growth. It was observed that it is best to apply nitrogenous fertilizer during the vegetative stages of pili trees to ensure sturdy branches while for bearing pili trees it is important to apply NPK or complete fertilizer plus chicken manure to produce more fruits of good quality. Another study was conducted testing the effectiveness of Prathista Bio-Organic fertilizer in grafted pili seedlings.

Gene bank was also established and maintained by DA-RFO 5 for the pili germplasm collection. Another study was initiated to identify, collect, and evaluate pili cultivars, by which promising strains were submitted to NSIC for approval as variety. After its approval, these varieties were propagated through asexual propagation and later sold or distributed to interested clients. At present, there are eight pili varieties approved by NSIC, and 74 promising strains being maintained in the region. Most of these are planted at the Albay Experiment Station clonal

orchard/scion grove.

Farm technology demonstrations on pili were spearheaded by DA-RFO 5 to showcase appropriate package of technologies in culture and management of pili. It was advised to practice diversification and integration of crops to increase productivity and profitability of a farm in a pili-based farming system. One case was the *Piliyamanan* model farms of the DA-Central Bicol Experiment Station (CBES) and Catanduanes Hilly Upland Development Station (CHUDS) as well as in Iriga City, Buhi, and Goa, Camarines Sur. The *Piliyamanan* field school was established through the conversion of the farmers' rest area or *dapayan* into learning centers. Field day, cross visit, and training on pili-based enterprises were also conducted. Intercrops planted included *adlay*, mungbean, corn, pole sitao, tomato, *upo*, squash, and papaya.

On product development, BAR recently funded the product and by-product development and commercialization of pili, which showcased food and non-food products of pili. A Pili Shell Craft Showroom at Tamaoyan, Legazpi City was established and served as the commercial processing area for pili shell. The products developed are now on display at Ayala Mall in Legazpi City.

Over 40 pili nut recipes were also developed and were now being used by rural women and interested stakeholders in the region. These products underwent several tests prior to package and labeling development. Ten rural women groups and processors are now using these recipes for their own business ventures. These processors are marketing

their products in pasalubong centers and other commercial establishments in the region.

As part of information campaign on pili, the Regional Technology Commercialization Center is currently disseminating the results of the analysis on pili kernel, pili pulp and pili oil conducted by the DOST-Food and Nutrition Research Institute (FNRI) Service Laboratory. The information generated was incorporated on the product labels to educate the consumers on the nutritional content of pili.

One important characteristic of the pili tree is its resiliency to climate change. Pili is known to be sturdy and could withstand strong winds, floods, and can easily recover from typhoons. It is easy to grow and resistant to pest and diseases. Once it is established or planted in the field it requires minimum maintenance. It also consumes less water. The pili kernel, on the other hand, can be stored for over a year at room temperature after removing the pulp and dried.

Money-making opportunities for Pili

According to Regional Executive Director (RED) Elena de los Santos, DA is continuously providing interventions to develop and promote pili industry. Improved postharvest and processing techniques and market promotion, in partnership with other stakeholders through participation at local and international agricultural fairs and exhibits, are some of the activities undertaken to boost the industry. Due to renewed interest on pili products, market expanded

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Capiz is one of the top rice producing provinces in the country and has attained 156 percent sufficiency level in 2008 making it one of the rice granaries of Western Visayas.

Although the province's rice sufficiency level is high, this does not reflect the life situation of the farmers in the community level.

In Dumarao, Capiz, 23 percent of rice area is irrigated while the remaining is rainfed. Rice is only planted twice a year and the fields are left to fallow during the rest of the year. Most of the inhabitants in Dumarao, particularly in the barangay level, belong to the middle and lower class brackets due to their incapability to make their farms more productive accompanied with rising prices of farm inputs and prime commodities.

High cost of inputs, lack of capital, and poor rice production technology resulting to low *palay* production – these have been some of the challenges that faced the farmers in Barangays Taslan and San Juan in Dumarao, Capiz.

This prompted the Department of Agriculture-Regional Field Office (DA-RFO) 6, in collaboration with Bureau of Agricultural Research (BAR) to implement a project on rainfed rice-based farming system through the Community-based Participatory Action Research (CPAR).

CPAR intervention

With the CPAR intervention, capability building activities was identified as one of the key strategies to counter the issues on low palay production. The CPAR farmer-cooperators underwent intensive trainings and farmer field school (FFS) on rice and vegetable production with emphasis on seeding rates, and use of soil analysis as tool for fertilizer recommendation. Cropping pattern on rice-rice + vegetable + goat was suggested. Moreover, participatory development was highlighted as the heart of the project.

After the series of trainings, farmers were hesitant to put into practice the technologies

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Empowering rice farmers with CPAR

by: MEDIFEL JUNIUS J. PANERIO, DA-RFO 6 | photos courtesy of DA-RFO 6



**Empowering...
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introduced to them. However, with the support from the project team along with various farm inputs and goat stocks provided to the farmers, they yielded to the project.

The result

According to Marcelina Crispino, CPAR project leader, “farmers were astonished with their production.” With the added knowledge on rice and vegetable

production and goat raising, the farmer-cooperators ended up appreciating the CPAR interventions, which resulted to higher income providing them more capital for other farming activities.

The success of the project was also manifested in the increase in the number of adopters of the technology. At the start of the project in 2011, there were only 10 farmers who were involved in the project. Following the boost in production and income, the number of farmer-adopters doubled.

In 2013, the project was barreled by Typhoon Yolanda. Crops were damaged and mortality of goats and other livestock increased. Although most of their crops and livestock were destroyed, farmers of Barangays San Juan and Taslan were not discouraged. Already equipped with the knowledge, skills, and technologies through CPAR, they persevered and pressed on with the project.

Now, the technologies

introduced have spread in adjacent barangays and have helped elevating the lives of other farmers. With the continuous application of the technology while disseminating its many benefits, the farmers of Capiz will no longer live on the breadline.

With the help of the CPAR intervention and unrelenting effort of the farmer-cooperators, the two barangays are now in a much better condition. ###

Reference:

Bureau of Agricultural Research (n.d.). CPAR Operation Manual. Retrieved from <http://bit.ly/2qM1zaL>
Department of Agriculture-RFO 6 (2009). PRA Results of Barangay San Juan and Taslan, Dumarao Capiz. Unpublished

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HARDWORK AND INGENUITY earned success in CACAO FARMING

by: ANECITA I. TELABANGCO, DA-RFO 11
photos courtesy of DA-RFO 11

“**S**ukad pa kaniadtong ako nanguma, karon pa nako nasina ti nga mokita’g dakong abot,” (Since I started farming, it is only now that I experienced earning big income) shared Romeo Bagaslao, a 70-year-old farmer from Brgy. San Isidro, Nabunturan, Compostela Valley Province.

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Tatay Romeo, as he is fondly called, could not contain his appreciation for the Community-based Participatory Action Research (CPAR) as he was able to earn much through its intervention. He was not only receptive of government's assistance, but his hardwork and ingenuity earned him success in cacao farming.

Tracing his farming roots

His success in cacao farming started in 1960 when he partnered with his father in planting coconut trees. His family was offered a 50-50 sharing in copra production on a quarterly basis but this did not suffice for his family's needs.

In 1980, his wife, Nanay Celedonia obtained cacao seeds of Brazilian variety when she visited her cousin in Sawata, Asuncion, Davao del Norte. Excited about cacao, the couple cultivated about 800 seeds even without much knowledge on plant propagation techniques.

When these trees started bearing fruits in 1984 until 1985, Tatay Romeo was happy that aside from copra, his cacao trees gave the family additional income. They were able to sell dried cacao beans at Php30 per kilo at the local market in Nabunturan. The price even dropped at Php12 per kilo during the early 90s, yet later on, the price of dried cacao beans increased to Php60 per kilo. With that price, however, Tatay Romy shared that they could harvest only about 10 cacao pods per tree due to cacao pod rot, a disease in their crop affecting their harvest. provide food for my family.

Improving cacao production

In 2012, when Typhoon Pablo hit the area in Nabunturan, homes and farmlands were devastated, and much of the affected crops have been cut down and uprooted because of the strong winds and continued rainfall. Tatay Romeo's over 200 productive coconut trees were not spared as they have been

cut down while a hundred of his cacao trees have been destroyed which took more than a year to recover.

The Pablo's wrath, however, did not stop Tatay Romeo in moving forward, as the local and national government have been very aggressive in assisting the affected farm families rise up after the typhoon. Various support services such as distribution of planting materials and other farm inputs, as well as trainings, were provided by the Department of Agriculture – Regional Field Office (DA-RFO) 11, and the municipal and provincial local government units.

In 2014, Tatay Romeo was active in attending a seminar on the Package of Technologies (POTs) on coconut and cacao. Through the support given by Mr. Gerardo Panyamogan and Mr. Wilmer Toring, agricultural technicians of the Municipal Agriculture Office (MAO) of Nabunturan; the Cocopal Program, a project implemented



by ACDI/VOCA - a nonprofit organization; and the DA-High Value Crops Development Program (HVCDP) provided *Tatay Romeo* with more planting materials as replacement of the missing hills.

His cacao trees started producing about 15-20 pods per tree. During that time, the price of cacao went a little higher at Php 80 per kilo. This prompted *Tatay Romeo* to go the extra mile in tending his cacao through exploring and innovating postharvest techniques. With the assistance of the Cocopal Program, he used indigenous materials and made his own local farm drier so that he could produce quality beans for a higher market price.

In 2015, DA implemented its Cacao Integrated R&D program and it gave *Tatay Romeo* an opportunity to be one of the farmer cooperators and with five others in the different provinces of Region 11. In his one-hectare land, *Tatay Romeo* offered his cacao 355 sample trees to be

subjected for research under a techno demo on rehabilitation.

”Under the rehab project, old cacao trees can still become productive and if sustained, can compete for quality beans, which means better price in the market,” said Mr. Simeon Fernandez, cacao R&D project leader. According to him, the rehab consisted of the following strategies: use of recommended cacao variety; improved water management even during dry periods using indigenous micro catchments; mulching; improved pruning technique; fertilization (a mixture of both organic and inorganic); and integrated pest management system.

With all these applied on *Tatay Romeo*’s cacao farm, his fruits of hardwork paid off. According to Lilybeth A. Panolino, co-project leader, most of the cooperators have seen the positive effects on the interventions in their farms after a year of implementing the project. Based on *Tatay Romeo*’s

farm record, from 15-20 pods in 2014, his harvest increased from 30-50 pods in a 6-month-period of initial harvest, from June to December 2016. From 8,000 pods per hectare, *Tatay Romeo*’s production increased to 30,000 pods, which he sold at Php 95 per kilo of dried beans.

According to him, since they started farming, it was only in December 2016 when the family had acquired a new 40-inch flat television set with sky cable, brand new refrigerator and a dining set. From old devastated coconut and cacao trees, *Tatay Romeo*’s story could tell that there is always hope, as long as one will work hard for it and ultimately trust God to bring them success. ###

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PROMOTING IMPROVED WHITE CORN VARIETIES IN

by: ANECITA M. TROZA, DA-RFO 13 | photos courtesy of DA-RFO Caraga

White corn is planted in over 23,000 hectares of land in Caraga region.

Often times, it serves as cooking ingredient for desserts such as corn cake, *suman*, and porridge. White corn is also roasted to make “corn coffee” while the plant’s silk fibers can be boiled to make tea.

White corn exhibits high nutritional value, containing protein, lysine, tryptophan, dietary fiber, minerals, and antioxidants. It has a low glycemic index which makes it slower to digest, resulting in a gradual

release of glucose into the bloodstreams, thus lowering the risk of diabetes.

Despite the many health benefits from eating white corn, only a few consumers utilize corn as staple despite high production which reached to an average yield of 3.5 tons/ha in Caraga Region. In addition, most farmers are growing traditional variety (*Tinigib*) with an average yield of 2.10 tons/ha.

To address this, the Research Division of DA-Caraga collaborated with the University

of the Philippines Los Banos-Institute of Plant Breeding (UPLB-IPB) to implement the project, “Considering Farmers Preferences in the Adaptation and Dissemination of White Corn as Staple Food in Caraga” which was funded by the Bureau of Agricultural Research (BAR). The project aimed to validate and promote newly developed improved white corn varieties as well as identify potential partners and collaborators for the dissemination, adaptation

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and diffusion of these varieties.

Participatory varietal selection (PVS) trials were conducted for four cropping seasons in corn growing areas in the Municipality of Tubay, Agusan del Norte and in Barangay Taguibo, Butuan City. Twelve corn varieties were tested following experimental protocols set by the IPB-UPLB. Farmers were invited on-site to select their most preferred varieties at maturity stage while sensory analyses of these varieties were conducted one month after. Out from these trials, two varieties emerged as most preferred: IPB Var8 and Northland White, which produced an average yield of 3.82 and 3.18 tons/ha, respectively. Furthermore, IPB var8 has 85 percent yield advantage over the traditional variety while Northland white has 51 percent yield advantage over the traditional variety.



Based on the cost and return analysis, it turned out that growing these new white corn varieties and traditional variety following the recommended practice can give farmers a net income of Php 19,240.00 compared to Php 15,994.00 in growing hybrid varieties. This is because labor and agricultural inputs of hybrid varieties are significantly more expensive compared to growing white corn and traditional variety.

“These varieties yielded higher and they have better eating quality compared to our local varieties. If possible we hope to request for our own supply of registered seeds so we can produce certified seeds for our local community,” said farmer cooperador Romy Lasco of Taguibo, Butuan.

In Tubay, Agusan del Norte where white corn is considered economically important, the project was able to introduce new varieties to farmers who has been using traditional low yielding varieties. “The project will help increase

production of white corn in our municipality since these has good adaptability in our area,” added Delma Vasquez, municipal agriculturist.

For the succeeding seasons, these varieties will be disseminated across the Caraga region. This project is also a way for neighboring farmers to be able to observe its performance firsthand in the field. To ensure accelerated dissemination of information to the rest of the local farming community, farmer-beneficiaries will also have to share a portion of their harvest to other farmers. The regional field unit in CARAGA hopes that through the project, there would be an increase in the utilization of white corn for it to be a staple in the region. ###

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for pili candies (roasted, glazed, and salted). These products are accommodated by big commercial establishments including SM, Robinson, Market Market, Rustans, Duty Free Shops, hotels, and other pasalubong centers.

Another initiative being done by DA, with partner agencies, is the mechanization of nut cracking in response to the increasing demand. At present, due to non-uniformity of pili nuts, nut cracking is still being done manually. Other efforts on the mechanization of post-production processing of pili is collaboratively being undertaken by various institutions such as DOST and state universities and

colleges (SUCs) for the production of prototype harvesting device, de-pulper and de-sheller. Storage studies and improvement of raw kernel and products, oil extraction and utilization technologies were also developed.

Given that pili is comparable to that of almonds and walnuts, its potential to shine in the global market is huge. Pili is now being introduced in the new product line of chocolate products. Based on the Value Chain Analysis for pili conducted by the DA-Agribusiness Marketing Assistance Service (AMAS), the country's export of pili nuts registered a positive growth in terms of volume and value. For

2012 alone, exports were valued at US\$ 65,962 of which Canada absorbing the bulk, together with USA, Bahrain, Japan, Norway, and Germany. Also, pili processors are now exploring China and Europe as potential markets.

RED de los Santos believed that cooperation and collaboration among industry players will encourage pili growers and processors to produce quality nuts fetching premium price. At present, pili is being marketed as fresh whole fruit, dried nuts, or shelled kernels. Prices are low during the harvest season (May-September) but command a high price during the rest of the year with peak during April and December. The current price of shelled kernels ranges from Php 300-500 per kilogram.

For 2017, the High Value Commercial Crops Program (HVCDP) allocated funds to all DA-RFO 5 Research Outreach Stations to produce a total of 430,000 sexual and asexually propagated pili seedlings for distribution in the region. This is part of DA's program to expand the areas for pili production in response to increasing demand for this commodity.

Through R&D, pili solidifies its position as a profitable commodity that Bicolanos can truly benefit from. ###



photo courtesy of DA-RFO 5

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The Rice Crop Manager (RCM), a comprehensive decision-making tool which provides farmers with crop and nutrient management recommendations customized to the farming conditions and needs, has proven its goal in increasing rice farmers' yield and income by more than 20 bags or as much as Php 4,000 income per hectare per cropping.

Launched in 2013 and developed by the International Rice Research Institute (IRRI) and the Department of Agriculture-Philippine Rice Research Institute (DA-PhilRice) with DA-Agricultural Training Institute (ATI), this revolutionary computer application can be accessed through a smartphone

or a computer with internet connection. Specifically, the application allows extension agents to provide farmers specific recommendations on nutrient, pest, weed and water management, depending on the variety that they used, their yield from the previous season, and the site-specific conditions of their field. DA under the Food Staples Sufficiency Program (FSSP) funded the project through the coordination of the DA-Bureau of Agricultural Research (DA-BAR).

Using a personal computer, smartphone, or tablet, RCM benefits extension workers, crop advisers, and other input and service providers who interact with farmers.

During the Farmers'

Field Day and Harvest Festival held on 10 February 2015 at the 20-hectare RCM Technology Demonstration Farm in Barangay Katil, Datu Paglas, Maguindanao, Pendong Mansula, one of the 20 farmer-cooperators, who normally yielded 97 bags (5.82 tons/has.), obtained the highest yield at 146 bags (8.76 tons/has.) from his one acre farm. This indicated that Pendong has able to increase his income by as much as Php 49,980.00

Ernesto Menor, who tilled 2.11 hectares has raised his yield by 80 percent or 203 bags (5.96 tons/has.) from his previous yield of only 3.32 tons/has. His brother Daniel harvested 103 bags from his one-hectare farm. He said, using the RCM recommendations

Earning more with RCM

by: NASRULAH K. DILANGALEN, DAF-ARMM | photos courtesy of DAF-ARMM





there was an increase of 17 bags from his previous 86 bags yield. Assuming at Php 17.00/kilo of palay, the increase in his income is Php 17,918.00 which is more than four times higher than the expected minimum increase of Php 4,000.00.

Menor said, after logging-in and answering 20 questions in a smart phone with the assistance of researchers, had automatically obtained the four bags each of urea and complete fertilizer as a recommendation to his one-hectare farm.

Recharl Pendatun, another farmer-cooperator said, “Our high yield in this demo farm is attributed to the proper use of water management. We see to it that every farmer-cooperator can avail of the supply of scarce

resource of water from the irrigation system”.

The RCM which is also known as precision rice farming can also determine the exact size of the farm. “Through the use of global position system or (GPS), the entire 20-hectare demo farm was found to be 28.14 hectares. This is a significant data in RCM to provide Crop and Nutrient Management”, said Tong A. Abas, RCM project leader and manager of the DA-ARMM Integrated Agricultural Research Center (ARMMIARC).

He furthered that “this is the first time that a demo farm was established by 20 farmer-cooperators who have registered as RCM farmers. In other demo farms we conducted, we compared RCM with other farming practices

and it turned out that RCM yielded the highest at 8.42 tons/ha using National Seed Industry Council NSIC Rc226”.

“We targeted more than 10,000 farmers to become RCM farmers in the four pilot areas such as, Datu Paglas, Sultan Mastura, Pagalungan and Datu Odin Sinsuat. We are almost complete and we will soon include the other provinces in the region,” Abas concluded. ###

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The Research and Development (R&D) Technology Commercialization Center of the Bureau of Agricultural Research (BAR), located at the BAR Lobby, was launched on 7 August 2009 to serve as a one-stop-shop for technology guides, and other information, education, and communication materials. The showroom features more than a hundred products and technologies generated from the bureau's two banner programs: Community-based Participatory Action Research (CPAR) and National Technology Commercialization Program (NTCP). It has been a functioning hub for visitors looking to acquire further knowledge on innovative products including the latest information and technologies generated from agriculture and fisheries R&D. This greatly helps in disseminating new and reliable information regarding better ways of doing agriculture. *(Photo by MEAquino)*



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