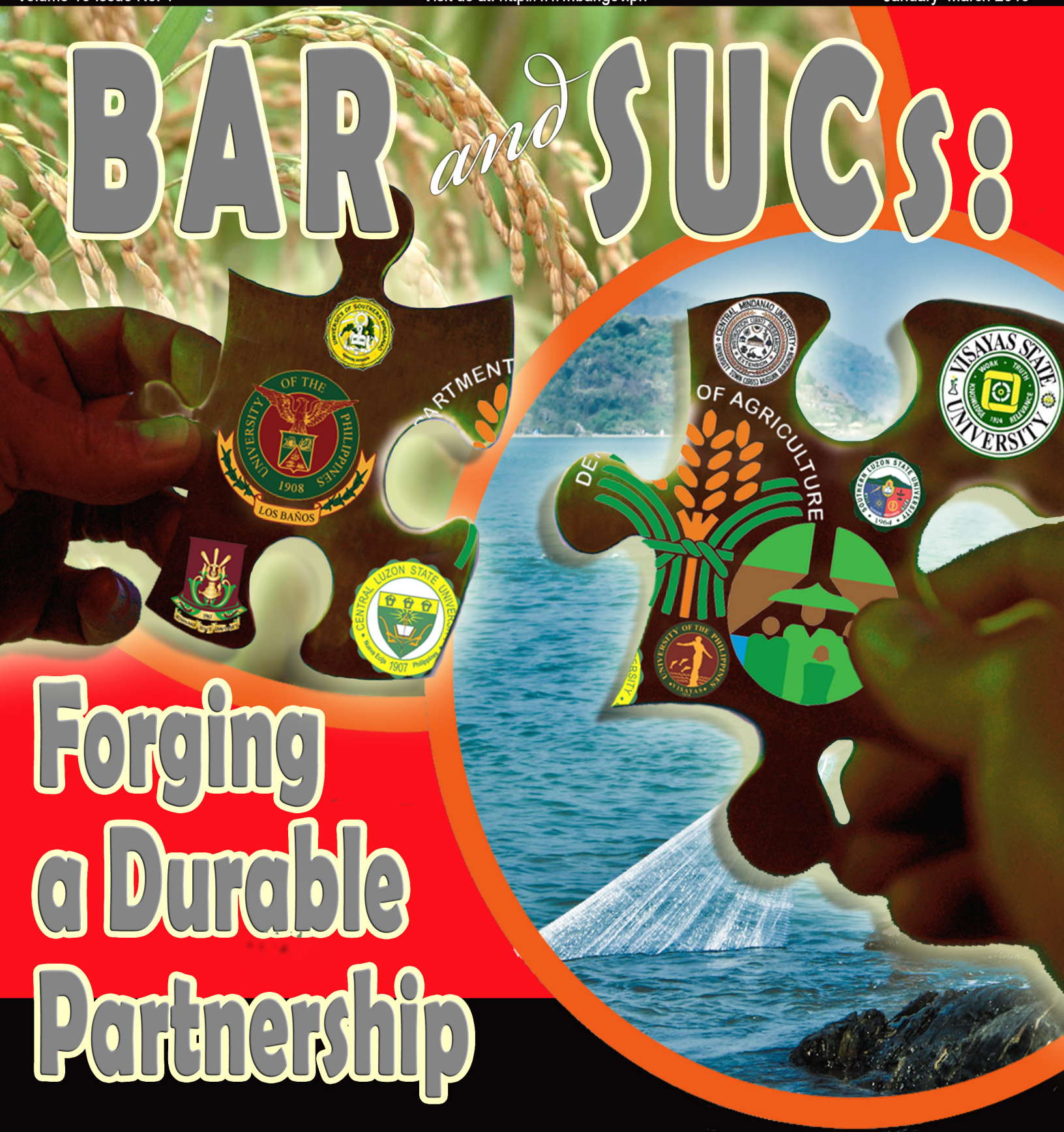
Research and Development
BAR DIGEST
Official quarterly publication of the Bureau of Agricultural Research
2013 National Year of RICE SAPAT NA BIGAS KAYA NG PINAS
Volume 15 Issue No. 1 Visit us at: http://www.bar.gov.ph January–March 2013



BAR Research and Development DIGEST
Official quarterly publication of the Bureau of Agricultural Research
Volume 15 Issue No. 1 Visit us at: http://www.bar.gov.ph January–March 2013

BAR R&D Digest is published quarterly by the Applied Communications Division of the Department of Agriculture-Bureau of Agricultural Research (DA-BAR) located at RDMIC Building, Visayas Avenue, Diliman, Quezon City, Philippines. 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 National Research & Development System for Agriculture and Fisheries (NaRDSAF).

For subscription and inquiries, please contact
Applied Communications Division - Publication Section
BUREAU OF AGRICULTURAL RESERCH
Department of Agriculture
3/F RDMIC Bldg., Visayas Avenue
cor. Elliptical Rd., Diliman, Quezon City
PHILIPPINES 1104
Trunklines: 928-8505, 927-0226, 928-8624
Local Nos: 3012, 3022, 3025
Fax: 920-0227, 927-5691
Email: rd@bar.gov.ph

Articles are also available online.
Visit our website at http://www.bar.gov.ph

ISSN 1655-3934

CONTENTS

3 R&D Notes: SUCs: Sharing BAR's Vision of a Better Life for Filipinos

5 BAR and SUCs: Forging a Durable Partnership for Growth

8 Exploring the Potentials of Banana Peduncle through Value-Adding

10 Stingless: The Bees of the Future

13 A Solution to One of Abaca's Most Dreaded Disease

15 Formulating a Cure for Cassava Phytoplasma Disease

17 Rediscovering Healthy Traditions in SOCSARGEN

19 Making the Big Step towards Fishery Product Enterprise Development in Carles

21 A Prospering Partnership to Address Hunger and Poverty in Mindanao

24 Bringing Back the Lost Value of Ferns

26 Re-establishing Quezon as One of the Country's Top Coconut-Producing Provinces

29 When Rice Foliage and Friendly Germs Meet

On the COVER

Forging partnerships is the lifeblood of BAR. As the national coordinating agency for agriculture and fisheries research, it must continuously work in close collaboration with its R&D partners, the most important of which are the state universities and colleges (SUCs).

STATE UNIVERSITIES AND COLLEGES:

Sharing BAR's Vision of a Better Life for Filipinos

by DR. NICOMEDES P. ELEAZAR, *CESO IV*

Bee products showcased by the UPLB BeeNet Program during the 8th National Agriculture and Fisheries Technology Forum and Product Exhibition held in August 2012.

It is said that in a true partnership, one complements the other. So it has been with BAR and the state universities and colleges (SUCs) wherein complementation and synergy governs the relationship.

BAR's partnership with SUCs began as soon as BAR was formed back in 1987 during the time of the first ever Director of the bureau, Dr. William D. Dar. The University of the Philippines Los Baños (UPLB) had already established a presence long before BAR came into being having been engaged by its predecessor, the

the SUCs share in the bureau's vision of a better life for Filipinos made possible through excellent work in **agriculture** and **fisheries R&D**.

DA-Agricultural Research Office, to supply much of the expertise needed in overseeing the DA's R&D function. Central Luzon State University (CLSU), University of Southern Mindanao (USM) and the then Visayas College of Agriculture (VisCA, now VSU) were also early partners on various R&D concerns.

It was but natural that the tie-up with SUCs continues with the birth of BAR and develop along with the maturation of the bureau and its systems. To this day, the SUCs share in the bureau's vision of a better life for Filipinos made possible through excellent work in agriculture and fisheries research and development.

The passage of the Agriculture and Fisheries Modernization Act of 1997 or AFMA paved the way for even greater interaction between BAR and the SUCs. The greater availability of resources meant that more collaborative research projects could be done, more R&D facilities and infrastructure such as farm laboratories and demonstration farms in SUCs could be developed, and more researchers and scientists could be nurtured in support of BAR's mandate of keeping agricultural research attuned to the needs of Philippine agriculture.

It was also through AFMA that the structure for working together was provided with the establishment of the National R&D System in Agriculture and Fisheries (NaRDSAF) in which selected SUCs were included. In the selection, SUCs were given national or zonal responsibilities. Others had regional or provincial responsibilities. Still others had narrower assignments particularly on specific commodities. In some instances, certain SUCs had multiple responsibilities such as UPLB and CLSU.

What makes the SUCs valuable is that they are strategically located all over the country, in practically all regions where agriculture and fisheries are significant. With their grassroots presence, they are in a position to render important assistance such as technology transfer to their municipalities, to their provinces, and their regions.

Some SUCs have strong scientific capabilities for specific commodities and special research themes/problem areas. Examples are UPLB on biofertilizers, genetic engineering, Integrated Pest Management (IPM), food technology, and farm machinery; Benguet State University (BSU) on highland horticulture; CLSU on small ruminants and freshwater aquaculture; UP Visayas on fisheries; VSU on abaca and root crops; and USM on rubber and oil palm.

For this issue of the *BAR R&D Digest*, we are showcasing some of the recent partnership that BAR has with SUCs. Innovation is not something new to R&D and we have it here in the search for practical uses of the banana peduncle - an erstwhile waste product in banana plantations, the attempt to put to commercial use the potentials of the Philippine stingless bee for honey and other bee products, and the development of value-added fishery products for an impoverished coastal community in Iloilo.

Future issues of the BAR Digest shall, on occasion, offer its audience "sneak previews" of the evolving body of knowledge from the BAR-SUC collaborations. This way, we hope to generate early interest on the themes and endeavors that these partners are working on and advocating. The Bureau shall continue to tap the knowledge and resources of the SUCs as they are an indispensable ally in the continuing quest for more effective technology and information that we can share with farmers, the farming communities and other stakeholders for the improvement of the nation's agriculture and fisheries. By helping the SUCs engage in what they do best, we are confident that we are also contributing to their empowerment. ###

> **SUCs** are an indispensable ally in the continuing quest for more effective technology and information that we can share with farmers, the farming communities and other stakeholders.

The protection of crops against pests and diseases is an unceasing task as problem organisms continue to prove themselves to be continuing menaces able to mutate into hardier forms or adapt to new cropping conditions. This issue offers insights into ongoing research on known diseases of abaca and cassava, and on the utilization of friendly microbes to combat soil-borne pathogens of cucurbits and crucifers.

Empowering farmers and farming communities also come through new ways of managing the farm (innovative farming systems) and is featured here for coconut and rubber plantations.

"Rediscovery" may be a relatively new theme at the DA but BAR and its partner SUCs are already into it with the food and nutraceutical potentials of native ferns getting a long second look along with the plant-based healing arts and traditions of indigenous cultures in Mindanao.

Cover Story

BAR and SUCs: Forging a Durable Partnership for Growth

by RITA T. DELA CRUZ

An effective and sustainable partnership entails high level of commitment and cooperation towards a common task, sharing risks and equally gaining benefits from such relationship.

In an effort to be a catalyst in modernizing agriculture and fisheries in the country, the Bureau of Agricultural Research (BAR) sets the directions in the formulation of the national research and agenda and programs, ensuring that the generated research results are adopted and used by its intended users.

Forging partnerships is the lifeblood of BAR. As the national coordinating agency for agriculture and fisheries research, it must continuously work in close collaboration with its R&D partners, the most important of which are the state universities and colleges (SUCs)—the seat of the country's pool of scientifically trained manpower.

Aside from their prime mandate of providing Instruction, Research, and Extension to their publics, the SUCs are an indispensable instrumentality in helping address local and global issues such as food security.

The partnership between BAR and SUCs began as early as the conception of the bureau and was further intensified in the coming incumbencies. Under this partnership, the role of SUCs and the academe is recognized particularly in the conduct of researches related to the acceleration of productivity and the generation of income from agriculture and fisheries.

The contribution of SUCs is indispensable considering that they are the foundation of the strength of agriculture and fisheries research in terms of manpower and resources. Their importance to the quality of research cannot be underestimated since these academic institutions play host to much of the country's pool of scientifically trained manpower.

The SUCs are the training grounds for experts in various disciplines.As a consequence, research results that can advance the country's stage of development are the universities' practical contribution to society.

University research contributes significantly to the build-up of the country's economic strength. Statistics show that over 30 percent of the growth in per capita income can be attributed to technological innovation. Most of these technological advances happened in the second half of the 20th century in the areas of biotechnology, agriculture and information technologies, originating mainly from university research.

The University of the Philippines Los Baños (UPLB), for example, has played an influential role in Asian agriculture and biotechnology due to its pioneering efforts in plant breeding and bioengineering,

BAR and SUCs

particularly in the development of high-yielding and pest-resistant crops. Pioneering efforts in biofuel research have also been conducted at this university which were made possible through linkages and networks forged with R&D institutions like BAR.

Modalities/Strategies to Enhance Partnership vis-à-vis R&D Agenda

SUCs have a critical role to play in strengthening the R&D capability, both at the national and regional levels, particularly in providing support for the government's renewed focus on boosting the nation's competitiveness, and ensuring a continuous and sustained development that can withstand shifting economic realities or political storms.

Currently, BAR is employing major strategies and agenda that could reshape the R&D system and beef up the agriculture and fisheries sectors in response to the challenge of agricultural modernization.

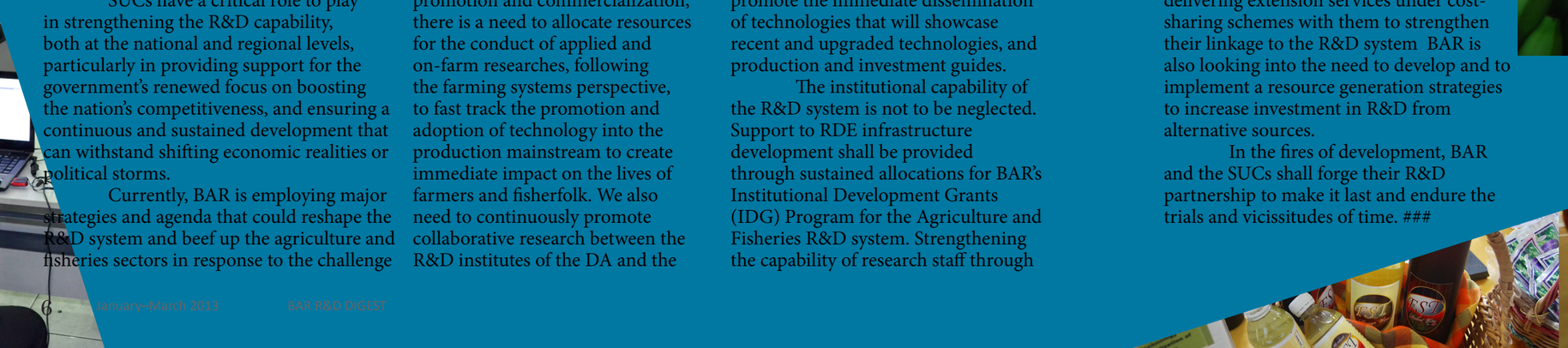
These strategies include: 1) intensifying technology promotion and commercialization; 2) strengthening institutional capability of the R&D system; and 3) advocating policies and developing strategies to increase investment in R&D.

In intensifying technology promotion and commercialization, there is a need to allocate resources for the conduct of applied and on-farm researches, following the farming systems perspective, to fast track the promotion and adoption of technology into the production mainstream to create immediate impact on the lives of farmers and fisherfolk. We also need to continuously promote collaborative research between the R&D institutes of the DA and the colleges and universities in agriculture to support R&D projects that have direct bearing on the development of small and medium enterprises and, more importantly, on the income-generating capabilities of resource-poor farmers and fisherfolk. There is also a need to establish mechanisms to improve knowledge exchange and effective knowledge management to promote the immediate dissemination of technologies that will showcase recent and upgraded technologies, and production and investment guides.

The institutional capability of the R&D system is not to be neglected. Support to RDE infrastructure development shall be provided through sustained allocations for BAR's Institutional Development Grants (IDG) Program for the Agriculture and Fisheries R&D system. Strengthening the capability of research staff through the bureau's Human Resource Development Program (HRDP) to improve the quality of research and increase the nation's level of competitiveness in agriculture and fisheries R&D shall also be implemented.

Lastly, there is a need to further advocate policies and develop strategies to increase investment in R&D. This can be done through continued support for developing the capability of the LGUs in delivering extension services under cost-sharing schemes with them to strengthen their linkage to the R&D system BAR is also looking into the need to develop and to implement a resource generation strategies to increase investment in R&D from alternative sources.

In the fires of development, BAR and the SUCs shall forge their R&D partnership to make it last and endure the trials and vicissitudes of time. ###



Exploring the Potentials of BANANA PEDUNCLE through Value-Adding

by LIZA ANGELICA D. BARRAL

The peduncle is a stalk supporting an inflorescence, which is that part of the shoot of seed plants where flowers form. The banana peduncle is usually thrown away and simply allowed to decompose in the field.

Dr. Mary Ann Tavanlar, a researcher from the National Institute of Molecular Biology and Biotechnology (BIOTECH) of the University of the Philippines Los Baños (UPLB), is spearheading a research project to address and solve the issue of transforming waste banana peduncle into useful value-adding products.

Data from the Bureau of Agricultural Statistics (BAS, 2012) shows that the total volume of banana production in the Philippines is 9,225,998 metric tons wherein Davao region is the biggest producer with 3,785,422 metric tons of banana. Total area planted and total area with bearing trees are 453,100 hectares and 281,624,904 hectares, respectively.

Based on the data of Dr. Reynaldo R. Valle , vice president for operations of the Unifrutti Corporation, which is one of the collaborating agencies involved in the project, the annual volume of peduncle produced per hectare is roughly six metric tons. When multiplied with the estimated 50,000 hectares of corporate farms that are planted to Dwarf Cavendish alone, the amount goes up to 300,000 metric tons of peduncle annually. Other banana varieties such as *saba, lakatan*, cardaba and *latundan* would contribute an even bigger amount of about 2,272,800 metric tons of peduncle. Imagine the large volume of banana peduncle put to waste every year.

How the Idea Started

According to Dr. Tavanlar, it was Dr. Rene Rafael C. Espino, associate professor of the Department of Horticulture, UPLB and the then national coordinator of the DA-High Value Commercial Crops (HVCC) Program, who brought up the idea of utilizing the waste peduncle back in 2007.

Dr. Espino visited banana plantations and saw the same situation of having huge volumes of waste peduncle. In an effort to address the problem, the team prepared a project proposal to identify the uses of banana peduncle aside from the traditional compost.

"We rationalized that fiber is apparently the main component and products that can be obtained from banana pseudostem and abaca can most likely be similarly produced from banana peduncle fiber. The products could be derived using equipment designed for abaca fiber extraction and processing, and similarly popularized through niche marketing," the researcher explained.

On 1 February 2011, to boost and energize the research agenda, Dr. Tavanlar implemented the project titled, "Banana Peduncle: To Waste or Not to Waste", that aims to determine and convert the components of peduncle into value-added products.

The research project specifically aims to 1) determine the composition of the banana peduncle, 2) extract, characterize, and process the components of the peduncle into fiber, pulp, celluloses and dietary fiber using conventional/chemical or biotechnology-based methods, 3) formulate useful products from the processed fiber and celluloses, and 4) test the acceptability of the products.

After determining the physical, chemical and functional properties, the researchers found out that fiber and juice are the main components of banana peduncle.

Results showed that peduncle juice is 80 percent of the peduncle by fresh weight, has high total polyphenol content, has high calcium and potassium contents and has no adverse or toxic effects to humans. On the other hand, the fibrous fraction was closely studied and results indicate that the cell length of peduncle fiber is longer with wider lumen than those from other non-wood materials while its contents are high in holocellulose, alpha cellulose and hemicelluloses but are lower in lignin.

Due to the significant findings, both peduncle juice and fiber components were utilized for value-adding purposes. As energy or sports drink, the juice was added to ready-to-drink calamansi for potassium ion and polyphenol fortification. The juice was also used as potassium supplement in hyrdoponics for various salad greens such as lettuce, and as liquid potassium fertilizer for banana and other high value crops.

Specialty paper from banana peduncle pulp

Dried banana peduncle fiber

Based on the limited fertilization experiments conducted by the project team, the use of peduncle juice plus nitrogen source like urea can create more biomass and higher marketable yield.

Dried fiber on the other hand, was utilized for dietary fiber enrichment and moisture retention in meat products such as burger patties, frankfurters and re-structured hams. Furthermore, the fiber was also used for the manufacture of fiber boards, and pulp and paper products, for micro cellulose production, and for making compost.

High Impact Project

The collaborators of the project realize the great potentials of processed fiber. According to Dr. Tavanlar, EARN Corporation, a private company that manufactures composite fiber boards, commented that banana peduncle fiber was an easier material to work with because of its zero silica content. "Extraction of sugars can be done more rapidly by soaking, unlike other agricultural wastes such as bamboo or rice straw," Dr. Tavanlar added. Peduncle fiber's low density makes it more suitable as light weight filler for composite fiber boards. Dr. Valle of Unifrutti Philippines expressed his interest in utilizing the peduncle composite fiber board as structural material for the farm.

The banana peduncle project will definitely provide additional income opportunities for banana farm operators and farm workers. When asked about the socio-economic impact of the project, Ms. Tavanlar explained that "the so-called emancipation of income from the international banana fruit trade may come in several ways. The window of opportunity was given a preview last year when trading with China was threatened (indirectly by the Scarborough Shoal affair) and the devastation of Mindanao by Typhoon Pablo. In other words, income from the fruit and income from banana peduncle can free small holder farms from dependence on the fruit trade which has political undercurrents."

The project team is planning to propose a second phase to conduct cost/benefit analysis and to refine the composite fiber boards. Part of the second phase also aims to explore the use of banana peduncle fiber as fuel pellets.

The new project is seen to offer an integrated waste management scheme for banana farms wherein the fertilization, construction, packaging material and fuel energy requirements of the farm can be addressed by banana peduncle products. The team is also planning to conduct information dissemination to create awareness with regard to the potential uses of banana peduncle. ###

This article is based on the project terminal report titled, "Banana Peduncle: To Waste or Not to Waste".

For more information, contact the project proponent Dr. Mary Ann T. Tavanlar, UPLB, Laguna. Tel: (049) 536-2721/501-2640.

References:

1. Peduncle.Retrieved 15 April 2013 from http://en.wikipedia.org/wiki/Peduncle
2. Department of Agriculture-Bureau of Agricultural Statistics, Major Fruit Crops Quarterly Bulletin, October-December 2012, Vol. 7, No. 1, p. 12-13

BAR & UPLB

Stingless:

The Bees of the Future


Trigona spp. (Stingless)


Propolis


Pollen

by RITA T. DELA CRUZ

Bees are essentially stinging insects. They use stingers for two main purposes: defense and predation. For the honeybees, they use their stingers strictly for defense. And they are likely to sting only if they are disturbed or they are unnecessarily aggravated.

For the case of the stingless bees or the meliponines, they too have stingers but they cannot sting and their defense mechanism relies on attacking the aggressor in groups.

The bees are important in the pollination of flowering plants including agricultural crops like fruits and vegetables. Pollination is one of the most important mechanisms in maintaining and promoting biodiversity.

Unfortunately, the numbers of pollinators are declining, a problem that continues to haunt the world apiculture industry, according to Dr. Cleofas R. Cervancia, president of Apimondia Regional Commission in Asia. Apimondia is the International Federation of Beekeepers' Associations and other organizations working on apiculture around the globe.

"We have what we call the colony collapse disorder (CCD) a phenomenon in which worker bees from a beehive or honeybee colony abruptly disappear. In our case, this is because of the problems associated with the introduced bee species, Apis mellifera, which is used in commercial beekeeping. This bee species that we import to produce honey is too susceptible to pests and diseases," reported Dr. Cervancia. She also revealed that although beekeeping is a viable industry in the country, it could hardly take-off because the culture of this commercial bee species requires high inputs with its need for miticides and antibiotics. Farmers can hardly afford the necessary supplies and equipment. "Also, the use of *Apis mellifera* is not sustainable since we have to import the queens from abroad due to the narrow gene pool of this species in Asia," she added.

Dr. Cervancia mentioned that given the right strategy and introduction of interventions and technologies, beekeeping can be a promising endeavor. "Currently, we import around 300 metric tons of honey with our production being only about 100 metric tons. With the high demand, we feel obligated to increase local honey production in order to meet the local requirement. .

Promoting Local Bees

Given the intensified support of the government in promoting beekeeping, Dr. Cervancia believes that interest in beekeeping will be high, "but the cost of re-stocking bees and equipment are proving to be prohibitive."

To address this, strategies have been developed and various research and development activities are being implemented through the project, "Commercialization of Beekeeping Technologies: Product Processing and Bee Production in Select Communities in Luzon". The project is being implemented by the Bee Program of the University of the Philippines Los Baños (UPLB) with funding support from the Bureau of Agricultural Research (BAR) under its National Technology Commercialization Program (NTCP). The project, which is led by Dr. Cervancia, is promoting the use of three local bee species: *Apis cerana* (known as *laywan*), *Apis dorsata* (giant bees or *pukyutan*), and more importantly, *Trigona spp.* (stingless or *lukot*). Promoting these local bee species is more sustainable and the farmers can easily adopt the technologies.

"That is why this is also the right time for conserving our local species. We can get a lot of products from them, like honey which has a very high demand and others including pollen and propolis," explained Dr. Cervancia.

Through the project, UPLB developed packages of technologies (PoTs) to strengthen the beekeepers' capacity in managing these native bees.

"In this project we have developed many possible technologies/interventions. One is on *Apis cerana* or the *laywan*. This species can be commonly found in the holes of wood, earthen pots, or under the sinks. We have a technology developed wherein we transfer them to hives. They are resistant to pests and diseases. There is no need to buy the box in which the bees are to be transferred as these are easy to make. These boxes could start as their colonies," Dr. Cervancia explained.

Meanwhile for the *Apis dorsata* and *Apis breviligula* or giant bees, Dr. Cervancia said that, "we don't grow them in the hives. The intervention or technology that we are promoting is just the conservation of these species through proper harvesting in the wild and most importantly, the hygienic way of processing their honey." She also mentioned that the honey produced from *Apis dorsata* and *Apis breviligula* or "pukyutan" measures up to organic honey standards. "Hence, the honey produced from them is of good quality and has very good potential in the market provided of course that the system implemented in harvesting and processing is correct," she added.

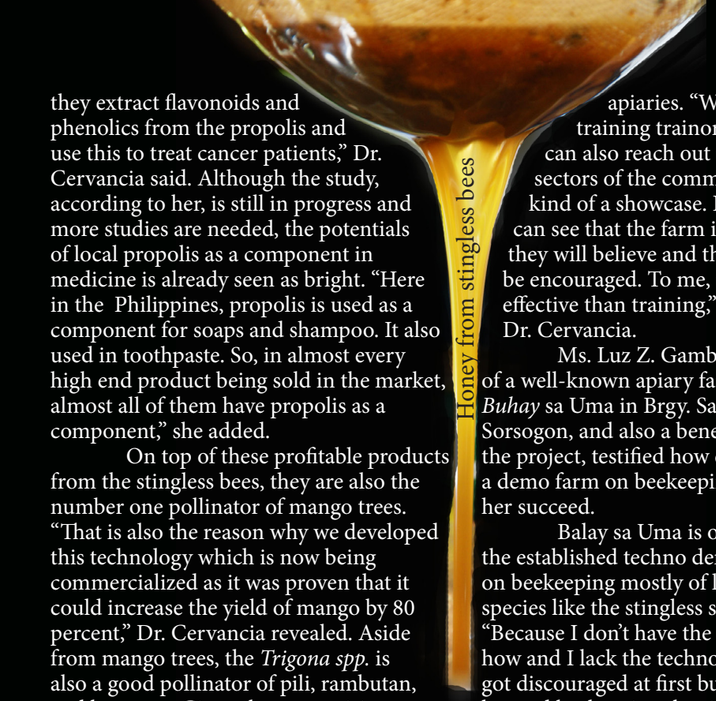
Aside from organic honey, another potential product from the giant bees is organic bees' wax. "Before, bees' wax was just being thrown away with the beekeepers not knowing how precious they are. But now, they process and sell them. Currently, a kilo of organic bees' wax costs P700.

A Bright Potential for the Stingless Bees

Among the native bee species that the project is promoting, the stingless bee (*Trigona spp.*), locally known as lukot or lukutan, is considered the milestone. Dr. Cervancia referred to this species as the "Bee of the Future".

"Stingless bees are the bees of the future because growing them is sustainable. They are abundant in the wild and there are many viable products that we can produce out of them. For one, the honey from the stingless bees is quite expensive. We also have pollen and most importantly, propolis," explained Dr. Cervancia.

She also reported that among the native species that the project is pursuing, the stingless bees produce the highest propolis. "Propolis has high clinical value and, among the bee products, this is the only one with high anti-fungal and anti bacterial properties. In Korea and Japan there is what we call the apitherapy wherein



they extract flavonoids and phenolics from the propolis and use this to treat cancer patients," Dr. Cervancia said. Although the study, according to her, is still in progress and more studies are needed, the potentials of local propolis as a component in medicine is already seen as bright. "Here in the Philippines, propolis is used as a component for soaps and shampoo. It also used in toothpaste. So, in almost every high end product being sold in the market, almost all of them have propolis as a component," she added.

On top of these profitable products from the stingless bees, they are also the number one pollinator of mango trees. "That is also the reason why we developed this technology which is now being commercialized as it was proven that it could increase the yield of mango by 80 percent," Dr. Cervancia revealed. Aside from mango trees, the *Trigona spp.* is also a good pollinator of pili, rambutan, and lansones. Given these promising characteristics, the group of Dr. Cervancia is now looking into the potential of stingless bees as pollinator of other high value crops.

Components of the Project

The UPLB-BAR project has three major components: training, establishing apiaries or technology demonstration farms, and product processing.

For the beekepers to learn the skills in managing these local honeybees, training is imperative. For the giant bees, beekeepers were taught how to harvest honey in a way which will not be detrimental to the environemnt. The traditional way of harvesting the honey is that people t burn the trees from which they will harvest the "pulot" from the giant bees. The group of Dr. Cervancia is promoting the smoking system (usok-usok) so that it will not destroy the *Apis dorsata* and the *Apis breviligula* in the wild. "On top of the training we also do lectures particularly the approaches on how to protect and conserve the environment. Also part of our interventions is the development of forage for bees. *Marami ka ngang bubuyog pero kung wala ka namang pagkain ng mga bubuyog* - that is why we are also developing the bees' plants. This is not a one-shot deal type of training so there is a need for close monitoring until they can do it on their own," explained Dr. Cervancia. Another important component is the establishment of techno demo farms/ apiaries. "We are training trainors who can also reach out to other sectors of the community. It's kind of a showcase. If people can see that the farm is earning, they will believe and they will be encouraged. To me, this is more effective than training," stressed Dr. Cervancia.

Ms. Luz Z. Gamba, owner of a well-known apiary farm, *Balay Buhay* sa Uma in Brgy. San Roque, Sorsogon, and also a beneficiary of the project, testified how establishing a demo farm on beekeeping helped her succeed.

Balay sa Uma is one of the established techno demo farm on beekeeping mostly of local bee species like the stingless species. "Because I don't have the know-how and I lack the technology, I got discouraged at first but when I learned beekeeping the right way and started to earn and profit from it, it felt good. Also, many people heard about our farm so they come here to learn," said Ms. Gamba.
She also mentioned the advantage of culturing stingless bees. "The stingless bees are good pollinators of our crops in the farm. Even our neighboring communities benefit from these pollinators. Their coconut plantations and fruits trees, even though they are not planted here in the farm, their yields have increased," she added.

Bee product processing is also an important component. This involves processing products from the bees including the use of propolis in cosmetics and medicine. For this component, Dr. Cervancia reiterated the importance of providing process standards to ensure that processing the products is hygenic and has followed protocols.

Future Plans

Dr. Cervancia hopes that, given that the technology is already there, it can also be brought to other parts of the country and not only in Luzon which is the Phase 1 of the project.

"Through this project, we wish to address the production-demand gap or at least decrease the country's importation of bee products. We are also looking into the possibility of one day exporting our own bee products abroad," said Dr. Cervancia.

"We have put in place an organic production system particularly for organic honey and organic bees wax. Currently we are formulating a Philippine National Organic Standards for Bee Products. The results of this BAR-funded project will serve as the basis for this new policy," she added.

"Currently we have many inquiries from the foreign market particularly on propolis. Inquiries have come from China and they need a lot of propolis. We also have potential for the export of stingless bees which other countries have inquired on, like Japan." "With beekeeping on stingless bees, the country is in a win-win situation" according to Dr. Cervancia. And rather than importing bees, it is time that "we export our local bees."

With this project, the current production has increased and has narrowed down the supply gap. Also, awareness on the potential of beekeeping has increased particualrly on the value of bee products. Future plans for the project include reaching out to more communities in Visayas and Mindanao. ###

For more information about the project, please contact Dr. Cleofas R. Cervancia, president of Apimondia Regional Commission in Asia through telephone no. 0908-8957249 or email at: *uplbbeeprogram@yahoo.com*

Dr. Cervancia teaches beekeepers how to harvest the honey from stingless bee hives

A Solution to One of Abaca's Most Dreaded Diseases

by ANNE CAMILLE B. BRION

The Philippines is well-recognized in the international business scene through one of its major industrial crops called abaca. Internationally known as Manila hemp, abaca is an indigenous plant that has been cultivated in the country long before the Spaniards came. Being a natural fiber, the Food and Agriculture Organization (FAO) of the United Nations considers abaca as one of the fibers of the future that can contribute to sustainable agriculture.

With the intensification of research and development (R&D) on agricultural commodities, more abaca-based products have emerged. The fiber which has been utilized as raw material for pulp, cordage, fashion, and fibercraft, is now also being explored for use in the car industry as a substitute for glass fibers in fiberglass parts. As reported by FAO, natural fibers can reduce the weight of car parts and are, more importantly, environment-friendly.

The significance of the abaca industry is not to be underestimated as it continues to be instrumental in providing livelihood to thousands of Filipinos that count abaca farmers, manufacturers, traders, exporters, and fibercraft processors. According to the Fiber Industry Development Authority (FIDA), the industry also helps boost the country's economy with its foreign exchange earnings that have amounted to US$ 80 million yearly from 2001 to 2010. As the world's leading abaca producer, the country provides about 85 percent of the total world abaca requirement with the remainder supplied by Ecuador.

Abaca's Trouble Goes Viral

Despite the many potentials of this agro-industrial crop, it is set back by its vulnerability to many pests and diseases. At the farm sector level, one of the biggest challenges faced by the abaca industry comes in the form of viral diseases such as mosaic and bunchy top. A virus spread by banana aphids, the Abaca Bunchy Top Virus (ABTV) is considered as a major cause of concern among stakeholders involved in the abaca industry.

ABTV-infected plants exhibit signs of stunted growth, bunching and rosetting of leaves, and chlorosis of leaf margins, among others. With diminished yield, this does not only affect abaca production, but the incomes of farmers as well. The spread of the bunchy top virus is attributed to the aphid known as *Pentalonia nigronervosa* Coq. which acts as a vector of the abaca virus.

Eastern Visayas is one of the abaca top-producing regions in the Philippines. According to the Bureau of Agricultural Statistics (BAS), abaca production in the region amounted to 20,000 metric tons in 2011, making it

> The abaca industry also helps boost the country's economy with its foreign exchange earnings that have amounted to US$ 80 million yearly from 2001 to 2010.

the second highest producer of abaca in the country following the Bicol region. It also had 39, 500 hectares of land planted to abaca in that year. In a recent article, Meniano (2013) reported that 19,107 hectares of abaca plantations in Leyte and Southern Leyte were affected by abaca mosaic and bunchy top virus in 2011.

Making the Disease Disappear

Most farmers resort to chemical insecticides to eradicate the pests that plague their farms. With the agriculture sector veering away from processes that have detrimental effects on the environment, the use of biopesticides as natural means to control insect and pest population is seen as a more sustainable alternative to chemical insecticides. They are safer, economical, and ecologically-friendly as they are largely harmless to beneficial insects.

In 2011, the Visayas State University (VSU), one of the leading universities in Southeast Asia for research in agriculture, collaborated with the Bureau of Agricultural Research (BAR) on a project that seeks to prevent the spread of the bunchy top disease. The project titled, "Evaluation of the Entomopathogen, *Lecanicillium lecanii*, for the Control of the Abaca Aphid, *Pentalonia nigronervosa* Coq.", sought to 1) evaluate and validate the efficacy of the entomopathogen, *L. lecanii*, under screenhouse and field conditions; 2) mass produce *L. lecanii* using appropriate media; and 3) evaluate the proper delivery system of the fungus. An entomopathogen is a microorganism that attacks particular insects and can be a means for the biological control of specific pests.

The study collected aphids from infected abaca plants from selected areas in Eastern Visayas. The aphids were killed and 10 were used on each of 10 replications. For 14 days, each set-up was examined daily for natural infection with entomopathogenic fungi. Mortality rate of aphids for the control entomopathogen, *Metarrhizium sp*., ranged from 8-40 percent while that for *L. lecanii*. was 19-36 percent.

Fungi from the dead aphids were isolated and then grown in a culture medium that used jackfruit seed agar. These were examined and identified based on available literature.

Abaca seedlings were obtained from the National Abaca Research Center (NARC) and were tissue cultured for the conduct of the experiments. They were placed in screened cages until aphid inoculation. The aphids, on the other hand, were collected from selected areas and transferred to the abaca plants for mass reproduction.

Ten aphids from the aphid population reproduced were collected and transferred to an abaca leaf disc placed on a petri plate. A treatment containing each of the entomopathogenic fungi used in the study was sprayed on separate leaf discs. After seven days of observation, data revealed that aphid mortality rate for *Metarrhizium* ranged from 20-94 percent, while the range for *L. lecanii* reached 30 to as high as 100 percent. These initial results show the promising potentials of the fungus, *L. lecanii*, as a biological pesticide that can control the aphid vector and inhibit the spread of the virus. The partnership between BAR and VSU is crucial in this initiative as it gives abaca growers the means to combat one of their mortal enemies. A bright future awaits the industry if the study continues to bear encouraging results. As VSU and other partner institutions remain steadfast in implementing R&D projects such as this, BAR, for its part, will continue to support them for the advancement of the agriculture and fisheries sector. ###

ABTV-infected plants exhibit signs of stunted growth, bunching and rosetting of leaves, and chlorosis of leaf margins.

The article is based on the project titled, "Evaluation of the entomopathogen, Lecanicillium lecanii, for the control of the abaca aphid, Pentalonia nigronervosa Coq." by Dr. Ruben M. Gapasin of the Visayas State University.

For more information on the project, please contact the proponent, Dr. Ruben M. Gapasin, National Abaca Research Center, VSU. Email: *rmgapasin1952@yahoo.com*

References:

1. Abaca. Retrieved on 28 April 2013 from http://www.fida.da.gov.ph
2. Future fibres. Retrieved on 28 April 2013 from http://www.fao.org
3. Meniano, S. (2013). Abaca disease eradication prioritized. Business World Online. Retrieved on 28 April 2013 from http://www.bworldonline.com/

Formulating A Cure for Cassava Phytoplasma Disease

by DARYL LOU A. BATTAD

Cassava is considered among the high value crops of the Philippines. Locally known as "kamoteng kahoy," it is now being promoted by the Department of Agriculture (DA) as one of the key staple food crops because it is widely available, safe, healthy, and is a cheap substitute to rice, contributing to the DA's call on promoting and achieving food sufficiency. Cassava is also a good source of animal feed, starch, adhesive, and ethanol. With the growing demand for cassava as a food staple and as an industrial product, the need to protect it from threats such as pests and diseases has to be given more importance now more than ever.

Data from the Bureau of Agricultural Statistics (BAS) shows that the volume of production of cassava in the Philippines reached 434, 324 metric tons (mt) in 2010. However, although this is a fairly good quantity, a decline of 1,609,395 mt of cassava was recorded from 2008 to 2010, leading one to think that the current figure could have possibly been higher. This significant decrease in production is attributed to pest infestation and disease infection, among others.

The current threat to cassava production is the Cassava Phytoplasma Disease or CPD. Phytoplasma-associated diseases cause production and economic damages on a wide variety of cultivated and wild plants. These are bacterial plant pathogens that cause devastating yield losses in low and high value crops worldwide.

This led the Visayas State University (VSU) with funding support from the Bureau of Agricultural Research (BAR), to implement the project, "Management of Cassava Phytoplasma Disease (CPD): Survey, Diagnosis, Characterization and Control", aiming to develop an effective integrated management system to control the disease. To realize this, the project seeks to systematically map out the incidence of CPD for the implementation of strict quarantine measures. It will also develop a protocol on the detection and identification of cassava phytoplasma disease and come up with an antibiotic that can effectively

Most varieties are not safe from the phytoplasma disease that is becoming prevalent in several parts of the country.

control phytoplasma and develop resistance inducers to fight the disease.

Occurrence and Incidence of CPD

The cassava phytoplasma disease has only been observed in the last two to three years in the Philippines. The disease became prevalent and continues to spread in several parts of the country with the increasing commercialization of the crop triggered by the high demand for food, feeds, and other industries.

Phytoplasmas are specialized bacteria recently assigned to the novel genus *Candidatus phytoplasma*, meaning without cell wall, in the class Mollicutes, that inhabit plant phloem tissue and insects. More than 600 diseases caused by phytoplasma are recorded in several plant species including cassava.

The effects of the diseases of the phytoplasmas range from mild to catastrophic in which up to 100 percent of areas planted are destroyed. These pathogens are difficult to control because their populations vary with time, space, genotypes, and climate change effects. Plants infected with phytoplasma show different symptoms such as stunted growth and shoot proliferation that is either chlorotic or with excessive anthocyanin pigmentation. Roots from infected plants are small with rough, textured skin and brown-streaked flesh. Older plants show symptoms of die-back and reduced yield.

In the study conducted by Dr. Erlinda A. Vasquez, a professor at the Philippine Rootcrops Research and Training Center (PhilRootcrops) located at the Visayas State University and the proponent of this project, CPD can cause yield reduction to about 50-70 percent when disease symptoms appear during the mid-part of the growing season and even 100 percent when infection starts during the first three months from planting date. High humidity and warm temperature favor the disease's development. Cases of CPD in the Philippines have been spotted as far as Isabela in Northern Luzon to the Visayas areas like Leyte and Bohol, down to Bukidnon, and Agusan provinces in the CARAGA region in Mindanao.

CPD-Free Cassava by Antibiotic Treatment

The identification of the source of CPD through a systematic nationwide survey, GIS mapping, along with its characterization and diagnosis, paved the way for the evaluation of antibiotics and resistance inducers for the control of CPD. Through the conduct of a comprehensive survey, this project was able to identify the areas in the Philippines where there already are occurrences of the disease.

The project team collected cassava samples infected with the phytoplasma disease. These samples were allowed to grow and express the disease symptoms before they were subjected to molecular analysis such as DNA extraction and polymerase chain reaction (PCR) analysis.

Antibiotics and resistance-inducer compounds known to control phytoplasma were used in different chemical absorption schemes using both infected and non-infected plants. Rates of germination, growth, incidence of phytoplasma, yield, dry matter, and starch content were assessed.

Interestingly, the results indicated that, apart from the disease-infected plant, the apparently healthy cassava planting materials were also infected with CPD. This then directed the researchers to make use of particular protocols such as proper selection of planting materials, especially if they are sourced out from areas which have CPD incidences, and treatment of planting materials with antibiotics prior to planting.

Treatment of planting materials with antibiotics increased the rate of germination and reduced the level of infection in both highly infected and healthy cassava planting materials regardless of the varieties used. Thus, the results of this study showed that the application of antibiotics on cassava cuttings before these are planted increased percent germination and decreased the occurrence of CPD, compared to those which were treated only after planting. The antibiotics generally suppressed the disease contributing to much better growth performance of the crop.

Building SUC Alliances for R&D

With BAR's determination in collaborating with State Universities and Colleges as partners in R&D, essential support and strong partnership are solicited by the bureau towards the attainment of the common goal of strengthening and sustaining the research and development programs for agriculture and fisheries.

Cassava has been included in the bureau's priority commodities and this is embodied in the 2011-2016 Research and Development, Extension Agenda and Programs or RDEAP. This ensures that the crop is continuously developed; taking into account all aspects that may contribute to the progress and sustainability of the cassava industry.

The collaboration with VSU was definitely good strategy as it is contributing to the development of the cassava sector of Philippine Agriculture through R&D projects such as this. With an effective management program on the way, BAR, VSU, and other collaborating agencies can look forward to a more productive and sustained cassava industry through introduced technology typified by this partnership project. ###

For more information about the project, contact the proponent Dr. Erlinda A. Vasquez, PhilRootcrops, VSU. Tel: (053) 355-2626, fax: (053) 335-2616, email: *lindvasq@yahoo.com*

Rediscovering Healing Traditions in SOCSARGEN

by LEILA DENISSE E. PADILLA

The affluence of Philippine culture can be traced back even to the early days when we were people who lived close to the environment. Until now, there are Filipinos who still take refuge under nature's roof and there they have preserved traditions that have been passed on from generation to generation.

In Mindanao, indigenous people (IP) communities in the South Cotabato-Sarangani-General Santos (SOCSARGEN) Region are vigorously practicing an age-old tradition of utilizing various indigenous plants to combat diseases and illnesses which eventually took an integral part of their daily lives and their ethnicity.

Seeing their rich traditional healing practices, the Mindanao State University-General Santos City (MSU-GSC), in partnership with the Bureau of Agricultural Research (BAR), is conducting an ethno-pharmacological study of medicinal flora utilized by the IP communities in SOCSARGEN Region with the goal of validating the therapeutic potentials of these indigenous plants through phytochemical screening and bio-guided assays.

Tapping the Diverse Paradise of SOCSARGEN

Located in Southern Mindanao, SOCSARGEN boasts of its rich and diverse natural resources and is. "…home to diverse biological resources, the region has several sites chosen as Key Biodiversity Areas (KBAs) which include Mt. Matutum, Daguma Range, and Mt. Busa," said project proponents led by Ms. Maria Luisa Non, assistant professor IV in MSU-GSC.

Seeking to widen medical knowledge and to discover new drugs based on current IP pharmaceutical resources; the project selected and identified four IP groups, namely: B'laan, Ubo, T'boli, and Tagakaolo, which reside in SOCSARGEN's naturally-diverse areas.

General Santos City is home to the B'laan community in Upper Labay and to the Tagakaolo community in Olympog. The Ubo/Obo community resides in Lake Sebu, South Cotabato while the T'boli community dwells in Maitum, Sarangani.

The specific objectives of the project are to conduct: 1) ethnomedicinal resource assessment of indigenous flora with medicinal values, 2) phytochemical screening, efficient purification, extraction, fractionation and detection of secondary metabolite compounds from indigenous plants with potential medicinal and nutraceutical applications, 3) pharmacological-toxicological assay of secondary metabolites from selected indigenous floral extracts, 4) microbiological screening of secondary metabolites from selected indigenous floral extracts, and 5) resource inventory and bioresource mapping of medicinal flora utilized by different IP groups in SOCSARGEN.

IP communities in Region XII

Investigating IPs' Healing Traditions

Based on the recently submitted semi-annual report of the project, the B'laan, T'boli, and Ubo communities were already visited and have undergone ethnomedicinal resource assessment. The Tagakaolo community was not yet fully surveyed due to delayed sampling caused by permit acquisition difficulties.

"Documentation of medicinal plant species utilized by the IP communities, Ubo, T'boli, and B'laan reveal a total of 56, 60, and 38 plant species, respectively, for a total of 130 identified plant species distributed in 39 families and 62 unidentified species," averred Ms. Non, the project leader.

The Ubo group was found to essentially utilize the roots of the plants to treat diseases while both T'boli and B'laan use the leaves. The three IP groups basically perform extraction and decoction of the roots or leaves before using it orally or topically on affected or diseased areas of the body.

Informant consensus factor (ICF), a value describing the degree of consensus or accordance of the people/informants in each IP community on which plant(s) to utilize for what disease, was also measured. A high ICF value means the community is sure and confident in the choice of plants they use in treating certain ailments while a low ICF value means the community is still experimenting as to which plant to use for a certain ailment.

"[It was found that there is] a high consensus among informants from the Ubo community of Lake Sebu, South Cotabato [which is] in contrast with the very low consensus of informants on the use of medicinal plants in B'laan community of Upper Labay, General Santos City and T'boli of Maitum, Sarangani," Ms. Non elucidated.

A phytochemical screening indicated that secondary metabolites (chemicals produced by plants to protect themselves from microbes, viruses, and competitors and later found to also protect humans against diseases) are present in the selected medicinal plants. All plant extracts were found to have varying levels of toxicity - some have great bioactivity while some have weak bioactivity.

The ethnomedicinal resource inventory and mapping yielded data on the identified medicinal floral resources cultivated ex-situ in the MSU botanical garden along with the coordinates of the study sites. A second visit to the sites will be conducted to collect more plants intended for *ex-situ* cultivation.

IP communities in Region XII

Strengthening R&D through Effective Partnerships

BAR, as the lead coordinating R&D agency of the Department of Agriculture (DA), gives high priority to the agricultural initiatives of partner institutions including state universities and colleges (SUC) like MSU.

Through the years, BAR and MSU have been partners in implementing relevant research activities and projects that aim to improve agricultural productivity in Mindanao while empowering its people. This project is one of many initiatives that aim to bring advancement in essential fields related to agriculture such as medicine, health, and culture. When the project reaches conclusion, more medicinal plants can be used to formulate natural and safe medicine for the public and the therapeutic practices preserved by IPs can be extended to every household which opts for nature's healing. ###

For more information about the project, contact Ms. Maria Luisa Non of MSU Gen. Santos City. Email: *bingnon@yahoo.com*

Making the Big Step towards Fishery Product Enterprise Development in Carles

by DIANA A. DE LEON

In communities wherein fishery is the main livelihood of most of the residents, the problem of dwindling fish catch is highly felt. Various strategies have been implemented by the concerned stakeholders to prevent the further decline of fish catch and, at the same time, conserve and protect the existing coastal resources. This is why every fish caught in the sea is important. Making the most use of each fish as food and for other uses needs to be given attention. Postharvest losses incurred are a significant loss, not only to the marine environment, but to the income of the fisher folk as well.

Creation of an alternative sustainable livelihood that shall complement the fishcatch is seen as a viable way to protect the interests of both the community and the marine environment.

Coming into the picture is the partnership of the Bureau of Agricultural Research (BAR) and the University of the Philippines Visayas (UPV) to help coastal communities gain the capability of maximizing the value of their fishery resources using various postharvest processing techniques.

UPV is the recognized leader in the field of fisheries and aquaculture education and research in the country. It is one of the seven constituent universities under the University of the Philippines System and has three campuses in Miagao, Iloilo City, and Tacloban. Under the College of Fisheries and Ocean Sciences, UPV has developed postharvest strategies to retain the quality and increase the shelf-life of fish which resulted to value addition for a variety of fishery products.

One way of transferring these technologies is through the BAR-funded project led by Prof. Encarnacion Yap, Prof. Merlina Andalecio, and Ms. Ernestina Peralta of UPV. The project titled, "Community-based Postharvest Fisheries Technology Transfer Program," is a capacity building project designed for the chosen residents of Carles, Iloilo.

This idea of strengthening the skills and capabilities of the residents of Carles materialized when Agriculture Chief Proceso J. Alcala visited the municipality of Carles and saw that the town has a rich supply of aquatic resources. To capitalize on these assets, he urged BAR and UPV to team up and capacitate the residents on the best fish postharvest practices for the municipality and hone them as Carles entrepreneurs on fish processing.

Prior to the training, the project team conducted a rapid assessment of the training needs in Carles. This is for the purpose of ensuring that the knowledge gap will be addressed by the training design that they will develop. After this process, 40 participants (31 women and 9 men) were chosen to join the extensive training on the various fish processing technology, food safety and personal hygiene protocols, and on the intensive discussion on marketing of products and entrepreneurship. To ensure that the training will be put to use, the participants were organized into a cooperative called Carles Isles Multi-purpose Cooperative (CIMPC).

Now, under the product brand, Carles Isles, the group produced bottled sardines in several variants, bottled *bangus* also in different variants, crispy anchovy (*dilis*) available in small pouches, marinated *bangus* and other kinds of fish, and smoked fish. The group was able to showcase these fishery-based products during the Carles Agri-fisheries Expo staged in October 2012.

Starting a small-scale enterprise and making it profitable are two different processes. CIMPC is still feeling its way through and, as it is a novice in the business, some things need to be honed and improved. This is why the proponents plan to monitor the progress of the group even if the training is already completed. According to Prof. Yap, this is their way to validate if the CIMPC members are putting into use the learning gained during the training. ###

For more information about the project, please contact the proponent Prof. Encarnacion Emilia S. Yap. Tel. no. (033) 315-9285/315-8142, email: *emiliasyap@yahoo.com*.

A Prospering Partnership to ADDRESS HUNGER AND POVERTY in Mindanao

by ZUELLEN B. REYNOSO

There are 81 provinces in the Philippines and the poorest is Lanao del Sur in Mindanao. Along with Apayao, Maguindanao, Eastern Samar, Zamboanga del Norte, Cotabato and Sultan Kudarat, these provinces rank among the top 15 poverty-stricken provinces in the country according to the National Statistical Coordination Board during the first semester of 2012 survey. The Autonomous Region of Muslim Mindanao (ARMM) alone accounts for 46.9 percent of poverty incidence in the whole country.

Charging the high incidence of ethno-religious conflict as the culprit, war-torn provinces cause migration and displacement issues as well as limited access to basic resources such as shelter, food, and livelihood. With problems like these, exacerbated by climate change concerns and the fall of the copra and rubber industry in early 2000s, Mindanao clearly needs a helping hand.

A Promising Partnership

In order to improve the situation in Mindanao, researchers and academics alike from the University of Southern Mindanao (USM) explored possible solutions towards reducing poverty through means that are sustainable for the community. Research and development (R&D) initiatives directed towards agriculture and fisheries development ensued in search of key projects that would answer the problem of hunger and poverty primarily within the region. Already accredited as one of the top universities with excellence in agricultural education, USM has expanded its research function as embodied by the University of Southern Mindanao Agricultural Research Center (USMARC) that is slated as the national research center for fruit crops, corn, and sorghum. It is the regional center for rice and other cereals as well as livestock and farming systems, and a cooperating station for vegetable crops and coconut. It also plays host to the Philippine Industrial Crops Research Institute (PICRI) created as the national research institute for industrial crops like rubber, fiber crops, and coffee, among others.

Joining forces with USM is the Department of Agriculture – Bureau of Agricultural Research (DA-BAR) with its vision of "a better life for Filipinos through excellence in agriculture and fisheries research and development". In partnering with a bureau that is mandated "to ensure that all agricultural research is coordinated and undertaken for maximum utility to agriculture," USM's R&D initiatives offer a more hopeful outlook on the struggle against hunger and poverty in Mindanao and the rest of the country.

Together, BAR and USM have completed projects directed towards specific areas in Philippine agriculture aimed at both providing sufficient food on the table and equipping the beneficiaries with tools to make their own living. Among these projects are cacao production, development of corn hybrids, marang postharvest technology, integration of rootcrops processing systems, development of *Hevea* clones, rubber production, and addressing climate change-related issues of major food crop production. On-going projects include production of oil palm hybrids, improving cultural management practices of herbs and spices, banana production, and improvement of rainfed agriculture practices.

BAR and USM, through rigorous R&D efforts, are now providing farmers with the capacity

to earn suitable incomes for their families and improve their livelihoods. Trainings, seminars, technology transfers, and close technical assistance empower farmers with the hope and knowledge that their way of living can and will get better. This hope, coupled with the ability to adopt technologies, provides the opportunity to live better. Thus, the partnership that continues to search for answers is testament to the commitment of each institution towards attaining food security and lessening, if not eradicating, poverty in the country particularly in Mindanao.

Rubber R&D in Mindanao

The Philippine rubber industry has greatly contributed to the growth of the Philippine economy since the early 1900s. However, due to the long maturation of rubber trees, outdated harvesting techniques and other issues concerning production, the rubber industry is far from achieving a steady expansion. Growing rubber trees takes time, money, and effort—three vital inputs needed in a region faced with a high demand for immediate sources of income and food. A tough issue but possible to tackle, especially with a team like BAR–USM around.

Through the years, BAR and USM have engaged in various projects on rubber in Mindanao that ultimately aim to increase profits of farmers in the rubber industry. These are initiatives that have focused on shortening the gestation period for rubber trees to reach maturity for harvesting, improving the quality of raw materials, and updating tapping and other postharvest techniques. Apart from these projects, international collaboration with the International Rubber Research and Development Board (IRRDB) was also established to speed up information exchange.

To date, R&D efforts are directed towards making the country one of the major players to provide for the increasing world demand for rubber. An estimated 3.7 percent growth in Philippine rubber production is expected within the next decade, and Agriculture Secretary Proceso J. Alcala himself puts his faith in collaborations such as BAR and USM's drive to increase rubber quality and production. The current 1 percent contribution of the Philippines to the whole world's rubber production shall slowly, but surely, increase, one percent at a time if need be.

Food for the Masses Project

Another significant project between BAR and USM is, "Pagkain Para sa Masa (PPSM): Enhancing Household Food Security through Improved Production of Root Crops and Vegetables," which promotes extension services after R&D initiatives. The program highlights crop-livestock diversified farming wherein techniques are shared with cooperators which they then can utilize in their own farms to maximize production. Techno-demo farms, technical assistance, and provision of quality planting materials are among the many tools employed in the project. Basically, the project's objective is "to promote better farming techniques and curb related impacts of food insecurity".

To date, techno-demo stations have been established to provide assistance to farmer cooperators within the area. Cooperators are now willing and able to produce rice + vegetable + rootcrops + small livestock in their farmlands. With this, they are able to optimize land use, provide food for the table, and gain profit as well as reduce the negative impacts of climate change in their region.

> "TOGETHER, **BAR** AND **USM** HAVE COMPLETED PROJECTS DIRECTED TOWARDS SPECIFIC AREAS IN PHILIPPINE AGRICULTURE, AIMED AT BOTH PROVIDING SUFFICIENT FOOD ON THE TABLE AND EQUIPPING THE BENEFICIARIES WITH TOOLS TO MAKE THEIR OWN LIVING."

A single yet vital project that allows farmers to harmoniously combine crops and livestock and use it to their advantage, it is the result of a collaboration of agencies, local government units (LGUs), regional field units (RFUs), and farmer cooperators for the benefit of the region. A truly all-for-one-and-one-for-all feat!

A Continuing Partnership

Partnerships that thrive harmoniously and work towards a common goal produce powerful and lasting results. Some technologies developed today are testament to collaborations between individuals and groups driven to provide better opportunities for the improvement of the living conditions of their fellowmen. Collaborations could bring endless possibilities especially when parties recognize the strengths and needs of the other. Such is the collaboration between BAR and USM. They are able to perceive the needs of Mindanao, how the region is overflowing with resources yet are not utilized to their full potential—hence, the various projects initiated between the two. The rubber projects and PPSM are just examples of the successful programs that could lift the status of living in Mindanao.

There are more crises to be overcome—a lot more situations to improve. Thus, we are charged with the duty to strive for sustainability not just for Mindanao, but for the entire country. ###

For more information on Pagkain Para sa Masa, please contact proponent Dr. Edwin G. Honrade, USM, Poblacion, Kabacan, Cotabato. Tel. no. (064) 248-2338, fax. no. (064) 248-2138, email: *rfhonrade@yahoo.com.ph*

References:

1. Ordinario, C. 2013. MAP: The Poorest Provinces in the Philippines. The Rappler. Retrieved 28 May 20134, from http://www.rappler.com/business/27276-poorest-provinces-philippines
2. The World Bank. 2001. Philippine Post Conflict Series 1: Social Assessment of Conflict-Affected Areas in Mindanao. World Bank Office, Manila: Pasig City, Philippines.

Bringing Back the lost Value of FERNS

by DIANA ROSE A. DE LEON

Reintroducing underutilized crops to the Filipino consumers is one of the strategies that the Department of Agriculture (DA) has come up with to help the country achieve the goal of food security and self-sufficiency.

This is a huge task but not impossible to accomplish if the government continues to forge partnerships with other organizations and collaborate towards strengthening research and development (R&D) initiatives for the underutilized food crops in the country. The academe plays a big part in this endeavor particularly the state universities and colleges (SUCs) as they are better acquainted with the commodities in their localities.

Cognizant of their capabilities and expertise especially in the field of agriculture and fisheries, the Bureau of Agricultural Research (BAR) has established linkages to support R&D endeavors with various SUCs in the country.

One of these SUCs is the Central Mindanao University (CMU), the premier university in the south located in Bukidnon. According to the 2011 list of top performing universities released by the Commission on Higher Education, CMU is in the eighth spot. CMU offers a broad range of academic programs and excels in the fields of veterinary medicine, engineering, forestry, agriculture, nutrition and dietetics, and teacher education.

Rediscovering Ferns

With the desire to promote the indigenous ferns in the country as a safe and healthy food, Dr. Victor B. Amoroso and Prof. Annabelle P. Villalobos of CMU proposed a project to BAR titled, "Establishment of pteridogarden and utilization of indigenous Mindanao edible ferns as an alternative food source." This two-year project aims to mass propagate 10 ferns that are indigenous in Mindanao, and to promote their health and wellness properties to the public.

Fern is an unconventional food choice for most Filipinos. The economic value of this plant is usually associated with its use as a softscape in indoor and outdoor garden landscaping.

Fern is a pteridophyte; meaning it is a vascular plant that produces neither flower nor seeds and propagates through spores found in its fronds (leaves). It is said to be the earliest plant in the world as its population can be traced back to over 300 million years ago. Today, there are an estimated 12, 000 fern species scattered throughout the world.

Aside from its aesthetic value, some fern species are known for their healing properties. One example is the rattlesnake fern used by Indians to treat dysentery. It is applied to snakebites, bruises, cuts and sores in the Himalayas.

The *Adiantum capillus veneris* is used for cough, and throat and bronchial disorder in India. The male fern root is known as a purgative aid for tapeworms and other parasites.

There are species of fern that help in agricultural productivity like the case of the mosquito fern (Azolla). It was found out that blue-green algae, which has nitrogen-fixing capability, are present in Azolla in pockets in its leaves.

For food, ferns such as edible fern crosier, ostrich fern, lady fern, etc. can be eaten as a salad, pickled, or even cooked as leafy vegetables. In the Philippines, *Diplazium esculentum*, commonly known as *pako*, is a popular ingredient for salads and stews.

Promoting Indigenous Ferns of Mindanao

The CMU proponents identified 10 indigenous edible ferns in Mindanao. These are: *Marsilea crenata* (apat-apat), *Pteris ensiformis* (pakong-parang), *Acrostichum aureum* (lagolo/mangrove fern), *Stenochlaena melnei* (hagnaya), *Diplazium esculentum* (pako), *Angiopteris palmiformis* (pakong kalabaw/giant fern), *Pteridium aquilinum* (sigpang/bracken fern), *Cyathea contaminans* (anonotong/ tree fern), *Aspleniumm nidus* (pugad lawin/bird's nest), and *Ceratopteris thalictroides* (pakong-sungay). These identified ferns are found abundantly in Mindanao and are used by the local people as food and medicine, although no comprehensive data on these plants exists.

The project has of four components. The first component is the establishment of pteridogarden at CMU. Pteridogarden comes from two combined words pteridophyte and garden. In essence, it is both an edible and medicinal fern garden. Aside from collecting and propagating the 10 indigenous edible and medicinal species of Mindanao, the CMU researchers will develop protocols for cultivating these edible and medicinal ferns. The second component is the determination of bioactive components such as antioxidants and proteins of the 10 indigenous ferns. The third component is the development of protocols on harvesting, processing and food preparation of indigenous ferns. The last component is the development of an educational program for the public on the health and wellness benefits of eating fern. This includes the production of brochures and other IEC materials for information dissemination and the conduct of seminars and training to create public awareness on utilizing fern as an alternative food source aside from its health and wellness benefits.

The proponents said that they have already built concrete structure for pteridogarden at CMU. The garden has five rectangular boxes and one circular pond for the two aquatic species. Another pteridogarden was established in the Mt. Musuan Botanical Garden for the mass propagation of the 10 indigenous ferns.

All the 10 indigenous ferns have been subjected to laboratory examination. Once results are obtained, the researchers will proceed to mass propagating and developing food processing techniques for eventual distribution to the stakeholders.

A lot more are needed to be done in selling to the public the goodness of ferns. BAR and CMU both hope that with this project the value of ferns will be recognized, and Filipinos will start appreciating and incorporating these indigenous ferns into their cuisine. ###

For more information about the project, please contact the proponent Prof. Victor B. Amoroso at *amorosovic@yahoo.com*

References:

1. Central Mindanao University. Retrieved May 2, 2013 from Wikipedia website, en.m.wikipedia.org/wiki/Central_Mindano_Univeristy
2. Fern: importance to humans. Retrieved may 2, 2012 from Encyclopedia Brittanica website, www.britannica.com/EBchecked/topic/204819/Importance-to-humans
3. Olso, Wilbur. (1977). Fern basic. Retrieved May 2, 2013 from Los Angeles International Fern Society website, www.laifs.org/basics.html
4. Srivastava, K. (2007). Importance of ferns in human medicine. Retrieved May 8, 2013 from Southern Illinois University Carbondale website http://opensiuc.lib.siu.edu/

RE-ESTABLISHING QUEZON AS ONE OF THE COUNTRY'S TOP Coconut-Producing Provinces

by PATRICK RAYMUND A. LESACA

The project seeks to establish a pilot agro-forestry coconut-based model farm, strengthen the management skills of coconut farmers, and take the lead in research and development in coconut-based agro-forestry technology.

The Southern Luzon State University (SLSU) is an educational institution which has eight campuses spread all over the province of Quezon. Its main campus is located in the Municipality of Lucban, a town sitting at the foot of Mount Banahaw. The University is recognized by the Professional Regulatory Commission (PRC) as one of the most competitive universities in the country and is known for its excellence in science, technology, culture, arts and agriculture.

Its mission and vision statements speak of a service-oriented university. The SLSU advocates for the protection of the ecosystems in the region while serving as an active instrument of peace, economic upliftment and the overall development of the community by producing globally-prepared, morally-upright, ecologically-conscious and productive citizens.

Coconut-Based Plantation and Agroforestry Demonstration Farm

Coconut is the country's leading agricultural commodity by area and currently the biggest agricultural export. It is processed into various products such as coconut oil—which is the country's biggest agricultural export. Its by-products include copra meal, activated carbon, coconut shell charcoal, coir and coir-dust (Dy *et al.* 2011).

Official data from the Bureau of Agricultural Statistics (BAS) shows that coconut production in 2010 was 15.51 million mt which is 0.91 percent higher than the 2006 output of 14.96 million mt which indicates an increase in national output over time. Average yield also increased to 45.48 kilograms per bearing tree in 2010 from 44.59 kilograms in 2006. This despite the fact that production went down by 1.00 percent in 2010 due to the dry spell in 2009 and the adverse effects of typhoon Juan that caused the falling of young nuts in Northern Luzon. From 2006 to 2010, area planted and number of bearing trees continued to increase by average annual rates of 1.74 percent and 0.41 percent, respectively.

The top coconut producer was Davao Region, contributing 16.99 percent to the national production in 2010. The other major producers were Eastern Visayas, Northern Mindanao, and Zamboanga Peninsula. These regions accounted for 11 percent or more each of the national production, while the CALABARZON produced 1.4 million mt or nine percent.

Realizing the potential of the coconut industry particularly in the province of Quezon in terms of generating economic activities and in addressing coconut production concerns, the Bureau of Agricultural Research (BAR) through a project, "Coconut-based Plantation and Agro-Forestry Demonstration Farm" at the university and nearby satellite campuses.

The project seeks to establish a pilot agroforestry coconut-based model farm, to strengthen the management skills of coconut farmers, and to take the lead in research and development in coconut-based agroforestry technology. It is in this context that the SLSU through its research, development and extension activities proposed the project that would contribute to the intensification of interventions for coconut in the province of Quezon and, ultimately, in the entire country.

SLSU experts advocate a systematic land management scheme that is suitable for the province and is ecologically-sound. This measure or system is imperative for the attainment of their goal and the collaboration with BAR, with its technical and funding

assistance, would enhance the university's coconut program whose immediate beneficiaries are the coconut farmers in Quezon.

SLSU believes that the system will warrant coconut production, as well as promote other food and industrial uses of coconuts, and, more importantly, alleviate the economic plight of coconut farmers.

The agroforestry demonstration farm was established in the Lucban and in Sampaloc campuses to demonstrate and test the economic feasibility and viability of establishing agro-forestry farms in the said province. The demo farm was also designed to encourage coconut farmers to adopt the system applicable in their own coconut plantations.

The introduced scheme or farming model in the farms are: Scheme 1: Coconut X Rubber Tree X Yam X Banana X Seasonal Crops; Scheme 2: Coconut X Malapapaya X Rambutan X Seasonal crops; Scheme 3: Coconut X Rubber Tree X Pineapple X Seasonal crops; and Scheme 4: Coconut X Malapapaya X Corn X Seasonal crops. Whatever scheme is adopted, coconut remains the main crop.

The pilot farms were set-up in existing coconut plantations with a total land area of one to three hectares. Each of the sites was managed by the university together with the identified farmer-cooperator. Depending on the scheme adopted, the area was planted with new coconut seedlings intercropped with fruit-bearing trees such as *langka, rambutan*, and others. Forest trees such as *malapapaya* and rubber were also planted along the perimeter. Annual crops such as pineapple, sweet corn, cassava, *gabi*, yam, sweet potato and seasonal crops such as *sitao* and leafy vegetables were also planted as intercrops.

Promising results showed an opportunity to help local farmers attain their goal of increased production and income.

According to the proponents, one of the promising cropping systems that will benefit the farmers in the municipality of Lucban is the sweet corn-based sequential cropping which was found to be economically viable under the system in three growing cycles. The system has the potential to diversify the income source of farmers and dampen the risks associated with unstable prices and damage due to pests and diseases with no adverse effect on the main crop (coconut). The system also provides the farmers with the means for year-round self-employment and food self-sufficiency.

The Collaboration

After several years of implementation under the collaboration between BAR and SLSU, particularly on the coconut-based farming system intercropped with the identified vegetables and fruit bearing trees, the project will establish the viable production model for coconut farmers in the region to adopt.

With this collaboration, both agencies are realizing the common vision of re-establishing the province of Quezon as one of the country's top coconut-producing provinces.###

This article is based on the project, "Coconut-based Plantation and Agro-Forestry Demonstration Farm."

For more information about the project, please contact the proponent Dr. Anabella B. Tulin of Visayas University, Visca, Baybay City, Leyte. Tel. no (053) 563-7229, email: *belle2460@yahoo.com*.

References:

1. Rolando Dy et al. 2011. The Business of Agribusiness. Center for Food and Agribusiness, UA&P: Philippines.
2. BAS Fact Book. 2010. BAS: QC Philippines.

BAR & CLSU

When RICE FOLIAGE and friendly germs Meet

by JACOB ANDERSON C. SANCHEZ

Growing up in an agricultural community that is surrounded with hectares of paddy field and a number of piggeries makes one appreciate the fresh produce and hard labor of small farmers. However, it also catches one unaware of the ill-effects of traditional but unfortunate practices such as slash-and-burn and the "business as usual" disposal of manure. These practices are prohibited and sanctions are given by law. Yet, among Novo Ecijaños, the rituals/habits continue into the present time.

To discover the potential uses of farm waste products, particularly as biopesticides, the Central Luzon State University (CLSU) has partnered with the Bureau of Agricultural Research (BAR) in the project, "Utilization of Rice Straw, Uncomposted and Composted Swine Manure to Suppress Soil-borne Pathogens in Selected Cucurbits and Cruciferous Vegetables in Nueva Ecija." Still an on-going initiative, the project is already contributing to the body of knowledge on biopesticides from farm waste.

This project is one of the many offsprings born out of a relationship between the CLSU and BAR. History shows that such partnership began way back to the times of Dr. William D. Dar when he was BAR Director in the 1980's, and former DA Assistant Secretary and concurrent OIC of BAR, Dr. Rodolfo C. Undan, from 1997 to 1999. Dr. Undan would later on assume office as CLSU president.

CLSU is one of the state universities and colleges (SUCs) that receive research and institutional development grants, degree and non-degree scholarships, as well as capability building like trainings and seminars from BAR and the bond between the two is special.

"The friendship between BAR and CLSU is unbreakable," said Dr. Timoteo M. Aganon, CLSU vice president for Research, Extension, and Training, in an interview.

In one event held at the university, BAR Director Dr. Nicomedes P. Eleazar talked about the strong partnership that BAR and CLSU have established. "CLSU has been one of the distinguished partner institutions which continuously pool resources and expertise that are geared towards the creation of a stable and sustainable agriculture sector. "I am a witness to the joint ventures and shared in the success of DA-BAR and CLSU through the years," he stressed.

Biocontrols Versus Fruit Rot-Causing Fungi

Nueva Ecija is one of the provinces that grow crucifers and cucurbits. Usually grown in dry season past rice, both are acclaimed as high value crops due to their high commercial value and demand by the consumers. However, the incidence of pre- and post-harvest fruit decay caused by Fusarium sp. and Sclerotium has led to yield loss to as much as 40 percent.

A recent study showed that incorporation of rice straw and composted swine manure can reduce the incidence of fruit rot in solanaceous crops such as tomato and eggplant. The explanation lies behind the biological activity and suppression of a wide array of microbial population developing during the composting process.

Though the precise mechanism of pathogen suppression has yet to be examined, the composted wastes are known to contain various bacteria and fungi which tend to offset the population of the fruit-rot causing fungi. Meanwhile, the rice straw may act as shield between the fruits and source of contaminations. It was also reported that rice straw improves the visual appearance of healthy fruits by preventing contact with soil, thus, making them more appealing.

Towards a Sound Ecological Footprint

CLSU's on-going project offers a simple answer to the chronic problem of farm waste such as rice straw and swine manure. Rice waste increases as more rice is produced to feed the increasing population. Farmers usually just burn rice straw as an easy means of disposal. However, aside from releasing carbon dioxide into the atmosphere, this practice contributes 8 percent of the methane that forms part of the green house gas (GHG) in the air. On the other hand, animal wastes like swine manure add up another 5 percent to the same GHG, thus contributing significantly to global warming or simplified in two words - climate change.

The general objective of the study is to determine the possible effects of farm-generated wastes in controlling soil-borne diseases of cucurbits (bitter gourd, bottle gourd, cucumber, watermelon, and squash) and crucifers (pechay and mustard) in Nueva Ecija.

After a set of nine treatments, i.e. rice straw in composted and uncomposted swine manure, the mixture will be mixed into the soil, the idea being that the mixture can prevent attack on plants by soil-borne pathogens. The presence of antagonist bacteria in the slab plus the moisture and heat it gives to the soil may be the trick behind it.

Additionally, rice straw was used as mulching media. Rice straw mulch prevented fruits from contact with infested soil by providing a barrier between the fruit and the free standing water. It may also improve soil fertility when it eventually decomposes.

Recent progress includes the collection of diseased plants from different cucurbit-growing areas of Nueva Ecija. This was followed by isolation of the suspected causal pathogen from the infected plant samples into pure culture. The isolated pathogens were purified, mass produced, and identified.

Simultaneously, swine manures were collected for composting purposes. Composting of swine manure was set up in an isolated area.

Right after identification of the isolated pathogens, pathogenicity test was conducted for Fusarium oxysporum f. sp. melonis, Sclerotium sp. and Fusarium solani f. sp. cucurbitae. A typical symptom of fruit rotting as observed in the field was also seen in all of the fruits inoculated with the isolated fungal pathogens.

> "It can also dramatically change the economic status of ordinary farmers and commercial growers while helping in the reduction of greenhouse gasses in the atmosphere."

Initial Findings

Symptom development was observed 72 hours after inoculation on the melon fruits. Symptoms of rotting as well as fungal growth were evident on inoculated areas. All the isolates inoculated were found to be highly pathogenic to melon fruits with 100 percent disease incidence. Fruits inoculated with sterile distilled water had 0 percent disease incidence.

At three days after inoculation, the severity of fruit rotting reached as high as 56 percent for fruits inoculated with Fusarium oxysporum f. sp. melonis and Fusarium solani f.sp. cucurbitae and 48 percent for Sclerotium spp. Development of symptoms and signs of the disease organisms were so fast such that in just seven days, the pathogens completely colonized the melon fruit. Disease severity was observed to be highest in all melon fruits inoculated with the three fungal pathogens. Fruits inoculated with sterile distilled water remained unaffected.

Fusarium sp.

Sclerotium sp.

Impact to Beneficiaries

The project hopes that the use of rice straw and swine manure or their combination will largely reduce the population of soil-borne pathogens that causes severe losses to small farmers' economic crops and income.

It can also dramatically change the economic status of ordinary farmers and commercial growers while helping in the reduction of greenhouse gasses in the atmosphere. On the other hand, BAR banks on the intellectual capability of CLSU to support the national agenda on Organic Agriculture and Climate Change.

In an interview with the Head of Planning and Project Development Division, Mr. Joell H. Lales said that the bureau values the long-term partnership between two agencies. He further added, "If one has the resources yet has no strong partners, then the program will be put in vain; BAR funds, monitors, and coordinates while CLSU executes."###

For more information about the project, contact the proponent, Dr. Ronaldo T. Alberto, CLSU. Tel: (044) 456-0673 loc. 5843, email: *bertyx1275@hotmail.com*

References:

1. Alberto, R.T. (on-going project) Utilization of Rice Straw, Uncomposted and Composted Swine Manure to Suppress Soil-Borne Pathogens in Selected Cucurbits and Cruciferous Vegetables in Nueva Ecija.
2. Gadde B, Bonnet S, Menke C, Garivait S.(2009) Air pollutant emissions from rice straw open field burning in India, Thailand and the Philippines. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/19201513
3. Excerpt from speech of DA-BAR Director Nicomedes P. Eleazar. Retrieved from http://www.bar.gov.ph

TINAWON: IFUGAO'S FANCY RICE

Tinawon, one of the heirloom rice varieties thriving in the Cordillera region, is now creating a niche market in the global world. Aside from being planted in the Ifuagao's Rice Terraces, a world heritage site, this variety of rice is organically grown which adds to its value and quality as an export commodity. Due to its exquisite aroma, distinct taste, and unique texture, the Tinawon rice is yearly exported to the United States of America where demand is constantly rising.

BAR is supporting the Tinawon production project through the Community-based Participatory Action Research (CPAR) which aims to increase the production of Tinawon as well as to supplement the export volume in order to sustain the needs of the farmers.

DEPARTMENT OF AGRICULTURE
BAR DIGEST
Research and Development

Bureau of Agricultural Research
RDMIC Bldg., Visayas Ave., cor Elliptical Road,
Diliman, Quezon City 1104

Entered as Second Class Mail at Quezon City Central Post Office Permit No. 752-07 NCR subject to Postal Inspection