

Optimizing the potentials...from page 7

of the three study sites. Meanwhile, the lowest soil losses and runoffs were found in the experimental treatment using ICP 7035 variety as hedgerow.

"After the study, we learned that pigeon pea as hedgerow is effective in controlling soil erosion," said Ms. Abalayan.

Developing *kadyos*-based food products

As a food crop, *kadyos* possesses a nutty, earthy taste and is a major source of protein. It also contains essential nutrients such as calcium, magnesium, phosphorus, potassium, selenium, iron, copper, manganese, zinc, Vitamin A, Vitamin B6, niacin, thiamin, riboflavin, folate, and pantothenic acid.

Cognizant to its rich nutritive value, CBSUA is developing various food products utilizing *kadyos*. These are: pigeon pea coffee with stevia, flour, cookies, *polvoron*, *pandesal*, pretzels, *empanada* with sprouted pigeon pea seeds, *puto*, banana cake, milk, and *taho*.

During the documentation conducted by BAR and FARM Foundation, Inc. through the TV program *Mag-Agri Tayo*, a cooking demonstration on *puto* and banana cake was performed by Ms. Melchora Abonal, study leader and researcher of CBSUA.

Standardization processes such as consumer acceptability, shelf-life stability, packaging, and marketability were conducted to further develop and improve these food products.

Promoting the potentials of *kadyos*

"The problem is that farmers lack information on how to plant and process pigeon pea. The farmers said that they need trainings or seminars about cultural management practices and about the proper rearing of pigeon pea from planting to harvesting," said Ms. Ma. Teresa Lirag, study leader and researcher of CBSUA.

Three hundred eighty-seven farmers in 14 municipalities of Camarines Sur were surveyed about their knowledge on *kadyos* and 91 percent or 348 farmers said that they

were familiar with *kadyos* as a source of food.

"Here in the university, we are producing various IEC materials on pigeon pea. Currently, we are making a production guide on pigeon pea," said Ms. Lirag. "As of now, we are more into promotions and information dissemination [activities]. We want to share to the farmers what our findings were so that they will become more interested in pigeon pea farming," she added. ###



pigeon pea puto



banana cake with pigeon pea

Japanese NGO and Albay governor adopt and promote **Edible Landscaping**



PHOTOS:UPLB

A BAR-UPLB collaborative project, Edible Landscaping (EL) is a new and innovative approach that combines science and creativity to form artistic techniques on crop production technology.

The Organization for Industrial, Spiritual, and Cultural Advancement (OISCA), a Japanese humanitarian agency, is one of the growing adopters of the Edible Landscaping (EL), developed and implemented by the University of the Philippines Los Baños (UPLB).

A joint project of UPLB and the Bureau of Agricultural Research (BAR), EL encourages home-based organic vegetable planting to increase food security and address import reduction, enhance the environment, and promote economic value for agritourism.

According to Dr. Fernando Sanchez, Jr., EL project leader, it produces organically-grown vegetable like fruits, herbs, and other medicinal

plants that can substitute for ornamental plants used in conventional landscaping. He added that edible landscaping produces a package of benefits that include an attractive, aesthetically pleasing and functional space, in addition to safe and nutritious harvest.

Meanwhile, Albay Governor Joey Salceda has encouraged his well-off family constituents to try edible landscaping. "Eat your landscape," he urged. He further said that the program can also serve as one of the strategies for climate change adaptation and "a practical way to beautify houses in subdivisions and suburban residences."

Funded by BAR under its National Technology

Commercialization Program (NTCP), EL has received Php1M during its initial phase of technology promotion in 2009 followed by the second phase in 2012.

The edible landscaping team with support from BAR's NTCP aims

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Taiwan agricultural scientists visit BAR

Seeking for the latest technology breakthroughs and establishing partnership among agricultural research institutes, a group of agricultural scientists based in Taiwan visited the Bureau of Agricultural Research (BAR) on 5 December 2013.

The foreign scientists were composed of Dr. Samson C.S. Tsuo, former chairman of the Asian Vegetable Research and Development Center (AVRDC); Ms. Hung His-Lee, deputy director general of the Department of Science and Technology; Dr. George Kuo, project coordinator of the Food and Fertilizer Technology Center for the Asian and Pacific Region (FFTC); and Ms. Helen Kuo, also from FFTC.

Heading the delegation was Dr. Tsuo who explained further the purpose of their visit particularly on forging partnership for the establishment of Agricultural Technology Research Institute in 2014. The Taiwanese scientists also shared the current situation of agriculture in Taiwan.

Mr. Patrick Raymund Lesaca of the Applied Communication Division (ACD) and Ms. Mara Shyn Valdeabella of the Office of the Director facilitated the briefing. Ms. Valdeabella gave an overview about BAR as the research arm of the DA



Agricultural scientists based in Taiwan together with BAR staff in a group photo PHOTO:LBARRAL

which is tasked to lead and coordinate R&D in agriculture and fisheries.

A short video presentation was shown to the Taiwanese visitors in order for them to see the wider scope of BAR's major functions. Meanwhile, Mr. Lesaca, together with the technical staffs of the bureau, initiated an open forum for the participants to clarify certain points mentioned in the BAR Primer. Technical staff members from different divisions explained the implementation and funding process of the two major banner programs of BAR, the National Technology

Commercialization Program (NTCP) and the Community-based Participatory Action Research (CPAR).

Mr. Lesaca thanked all the Taiwanese scientists for visiting BAR. As a token of appreciation, Ms. Valdeabella handed over various BAR publications to the foreign visitors. The visit was made possible in coordination with the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD). ###
(Liza Angelica D. Barral)

minimizing postharvest losses require appropriate and effective handling techniques which start from harvesting to transport and storage.

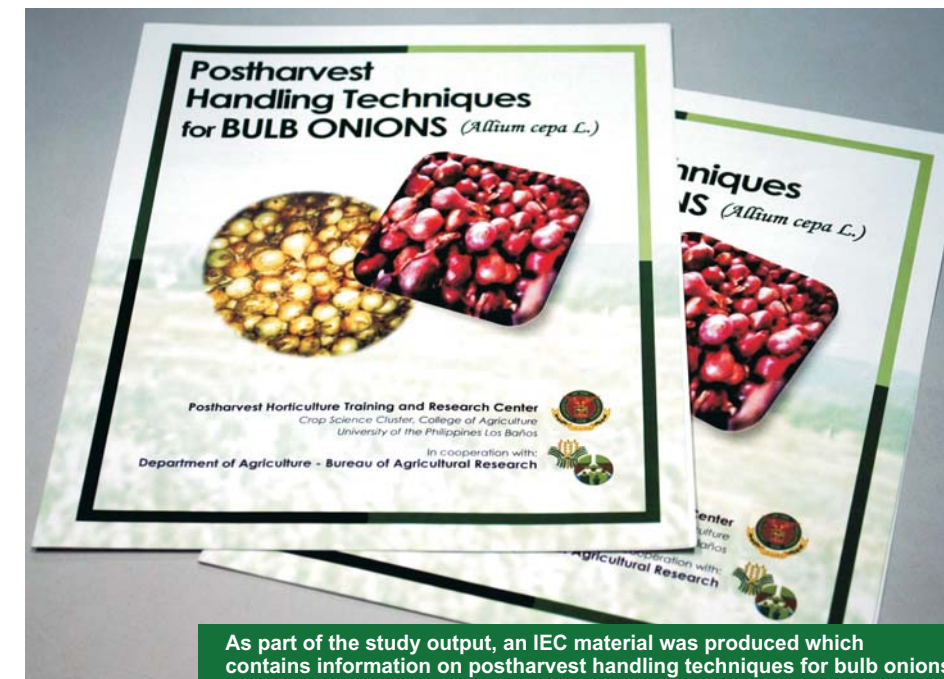
Minimizing postharvest losses

Developing postharvest handling techniques for bulb onions requires a study that would re-examine the current pre- and post-harvest handling practices and assess technology utilization in the onion supply chain. Given this need, a project titled, "Documentation of the Pre- and Post-harvest Management in Bulb Onions and Optimization of Handling Technologies for Systems Improvement", was implemented by the Postharvest and Seed Sciences Division, Crop Science Cluster, College of Agriculture, University of the Philippines Los Baños (UPLB). The project, led by Dr. Dormita R. Del Carmen, was funded by the Bureau of Agricultural Research (BAR) under its National Technology Commercialization Program (NTCP).

The project aimed to document the pre- and postharvest management systems in bulb onions in three major producing provinces of the country (Mindoro Occidental, Nueva Ecija, and Pangasinan); assess the produce quality and losses under the different management systems in use; and identify postharvest technology gaps and recommend handling intervention protocols appropriate to the management systems.

Results of the project documentation showed that practices, problems, and challenges faced by the onion industry stakeholders in the three major producing provinces did not change much over the years. "The cultural practices are almost the same and are not far from the recommended practices except that with time newer technologies are being infused into the practices like the introduction of new onion varieties or new types of fertilizer/pesticides or more extensive use of organic fertilizers," reported Dr. Del Carmen.

In the SWOT (strengths, weaknesses, opportunities, and threats) analysis of the study, it



As part of the study output, an IEC material was produced which contains information on postharvest handling techniques for bulb onions.

showed that "the biggest problem and threat to the onion industry is competition from imported onion bulbs." Imported onions are usually priced lower and accordingly have better quality than the locally grown onions. Other postharvest-related requirements that were raised by the stakeholders included: need for additional cold storage facilities, facilities and technologies for temporary storage, and establishment of an onion research institute to address location-specific R&D needs.

The need for IEC

In the study, Dr. Carmen and his group found that, despite the availability of a number of information education and communication (IEC) materials on onion production and handling techniques, many stakeholders are not aware of these as the materials were not readily available to them. "Farmers usually get the updates on onion cultural management technologies from the seed and pesticide companies in the localities," she explained.

In view of this, their group came up with a compilation of the available IEC materials on onion production and handling, and prepared a brochure on postharvest handling techniques for bulb onions which forms part of the study output. The brochure tackles the proper postharvest handling techniques from harvesting to

market preparation, from packaging and transport to storage. It also discusses information on the *don't's* in postharvest handling of onions.

Through the study, relevant information were generated specifically on the quality characterization and evaluation of the available local onion varieties, and on identifying and verifying postharvest technology interventions which the industry can use as benchmark in planning and implementing further technology development programs that would enhance the competitiveness of the Philippine onion industry. ###

This article was based from the unpublished terminal report titled, "Documentation of the Pre- and Post-harvest Management in Bulb Onions and Optimization of Handling Technologies for Systems Improvement", submitted by the Postharvest Horticulture Training and Research Center, Crop Science Cluster, College of Agriculture, University of the Philippines Los Baños.

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Minimizing postharvest losses in onion through effective handling techniques

Story and photos by Rita T. dela Cruz

Addressing food security is not just about increasing production. It should also ensure that the food being produced do not go to waste. In a study conducted by the Consultative Group on International Agricultural Research (CGIAR), “roughly one-third of the food produced in the world goes to waste, a staggering 1.3 billion tons every year.” Hence, addressing postharvest loss is also important in the fight against global hunger.

One good case is that of bulb onions. Bulb onions that are harvested from the farms pass through several traders or middlemen before they reach the consumers. Postharvest losses are incurred at each channel in the supply chain that the produce passes through.

In a recent loss assessment study, total postharvest loss for bulb onions, from the farm to the retail level, is about 35 percent (5 percent from farm, 12 percent from

wholesale, and 18 percent from retail). This is a huge loss for onion growers.

Proper postharvest handling techniques are therefore essential to minimize losses and to address the need for more food and increase farmers' income.

Making Phl onions globally competitive

Onion is one of the top five vegetables in the country. There are two major types of onion grown in the Philippines, the “Red Creole” and the “Yellow Granex”. For red onion, the major or common variety used is the “Red Pinoy” while the “White Bravo” variety is for white onion.

The onion industry is a major source of livelihood and income among farming Filipinos especially those in Luzon. However, given the challenge of trade liberalization and climate change, production and marketability of this crop remains hounded and unstable.

In fact, according to the Bureau of Agricultural Statistics (BAS), onion production has declined

for the last four years (2007-2011) by an average of 2.96 percent annually. Area harvested also went down with an average yearly rate of 1.90 percent.

Among the identified causes of production decrease were: natural calamities and infestations, conversion of agricultural lands to other uses resulting to declining crop areas, and onion importation that discourages onion farmers from planting as it makes the crop unprofitable for them. In 2012, onion production continued to decline by 12 percent according to reports. The major culprits were climate change and, still, unabated onion importation.

Given the challenge of onion importation, local varieties are having a difficult time competing. Quality of products is an important aspect to be globally competitive. Technology intervention on quality improvement is therefore needed. Ensuring quality onions and

Edible Landscaping featured in BAR seminar



Representatives from the DA-Regional Field Units, state universities and colleges, cooperatives, and the private sector attend the activity. PHOTO:LPADILLA

Who wouldn't want a beautifully landscaped courtyard full of edibles?

Realizing the demand and value of fresh harvest readily available to households through strategic landscaping, the Bureau of Agricultural Research (BAR) organized a seminar featuring the components and process of edible landscaping (EL) on 12 December 2013 at the BAR Conference Hall.

“Landscaping is very important in agriculture. Through edible landscaping, we do not only beautify the environment but we can also ensure food security,” said Dr. Teodoro S. Solsoloy, assistant director of BAR, during his welcome remarks.

Invited as resource speakers were edible landscaping experts from the University of the Philippines Los Baños (UPLB): Ms. Maria Charito Balladares, researcher; Mr. Ryan Rodrigo Tayobong, instructor; and Ms. Eliza Aquino, research assistant. They are also the members of the team implementing the project titled, “Technology Promotion and Commercialization of Edible Landscaping” funded by BAR

through its National Technology Commercialization Program (NTCP).

What's unique with EL

“The goal of edible landscaping is to entice people to plant what they eat and eat what they plant through aesthetically producing their own food,” explained Ms. Balladares as she talked about what edible landscaping is all about.

Edible landscaping, the science and art of revolutionary crop production anchored to landscaping principles, sets itself apart from conventional landscaping as it utilizes

crops such as herbs, spices, and vegetables instead of the usual ornamental plants.

Since it employs the fundamental tenets of landscaping, edible landscaping is usually located in the premium front spaces of the residential area, making it different from the typical vegetable gardening situated at the back spaces of home gardens.

The main objective of edible landscaping is to create an attractive environment, to construct functional spaces, and to produce safe and nutritious food for the table. Since Filipinos eat less vegetable, edible landscaping can encourage family members to eat more vegetables while enjoying the sight of a well-landscaped garden.

How EL is done

“We have the edible landscaping triangle which has three components: design phase, implementation phase, and maintenance phase,” said Mr. Tayobong as he discussed about the process of doing edible landscaping.

In the design phase, the plan for the whole area during the entire production period is tactfully prepared. The design elements such as color, form, line, size, and

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EL experts from UPLB (L-R) Ms. Maria Charito Balladares, Mr. Ryan Rodrigo Tayobong, and Ms. Eliza Aquino serve as resource speakers for the seminar. PHOTOS:LPADILLA

BAR celebrates a simple merry Christmas



PHOTOS:BAR

In the spirit of Christmas, the Bureau of Agricultural Research (BAR) held a simple, fun-filled, yet meaningful Christmas celebration on 18-19 December 2013. Being grateful for all the blessings received and fruitful accomplishments achieved by the bureau for the year, a thanksgiving mass was held which was officiated by Reverend Father Christian James Castro of the Claretian Missionary Fathers.

In light of the occasion, the bureau remembered the Yolanda victims and prayed for their immediate recovery. BAR Director Nicomedes Eleazar acknowledged the support of the staff in helping those who were affected by the typhoon. The bureau chief also mentioned that “we should not forget why we celebrate Christmas—and that is to remember the birth of Jesus Christ.”

Recognizing that Christmas is for the children, the children of BAR employees experienced the joy of gift-giving and played exciting games that were specially prepared for them. As for the BAR staff, dance presentations

from each division and unit highlighted the occasion. Dressed in fancy colorful costumes, staff members participated actively in the dance numbers that were accompanied with different Christmas carols. The top three presentations of the night were recognized for their efforts and were given prizes. In third place was the Accounting and Finance Unit with their dance of novelty songs remixed with Christmas songs. Winning the second prize was the Planning and Project Development Division (PPDD) with their groovy dance steps played along with modern songs. Claiming the top spot was the Information Management Unit (IMU) with their unique performance as little drummer boys. Consolation prizes were also awarded to all participating groups.

This year, the Technology Commercialization Division (TCD) headed by Mr. Anthony Obligado organized the celebration. ###
(Anne Camille B. Brion)



protocols for product standardization; 3) develop package of technology of the different products; 4) mass produce the products; and 5) push for the commercialization of the products.

Currently, the ZAMPIARC Product Development Laboratory has already been renovated, and the equipment and processing facilities for the development of *huani* products have already been procured. The products that were developed out of the *huani* fruit have already undergone sensory evaluation to determine which would be most preferred by the consumers. Their acceptability was evaluated in terms of color, smell, taste, odor, and aroma. The products with treatments that gathered promising results will be submitted to the Industrial Technology Development Institute of the Department of Science and Technology (ITDI-DOST) for complete product testing and analysis.

With its flavor, firmness,

and ability to thrive in moist areas, *huani* can also make its way as one of the economically important fruits of the Philippines. This fruit can provide more income-generating opportunities to our farmers, while its potentials can also be harnessed in future breeding programs and activities in the mango industry. ###

The article is based on the project, “Product Development of *Huani* mango (*Mangifera odorata*) in Zamboanga Peninsula (Phase I),” implemented by the Zamboanga Peninsula Integrated Agricultural Research Center. For more information, please contact Ms. Norma Poblacion through (062) 333-2570 or email: dawesmiarc@yahoo.com

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Huani products developed by DA-ZAMPIARC



PHOTOS COURTESY OF DA-ZAMPIARC

Japanese NGO and Albay...from page 1



An edible landscape designed by the UPLB EL Team during BAR's 8th National Technology Forum. PHOTO:RDELACRUZ

to create a new approach in organic vegetable production and continue to find ways in packaging the technology to increase its demands and potentials for further adaptation.

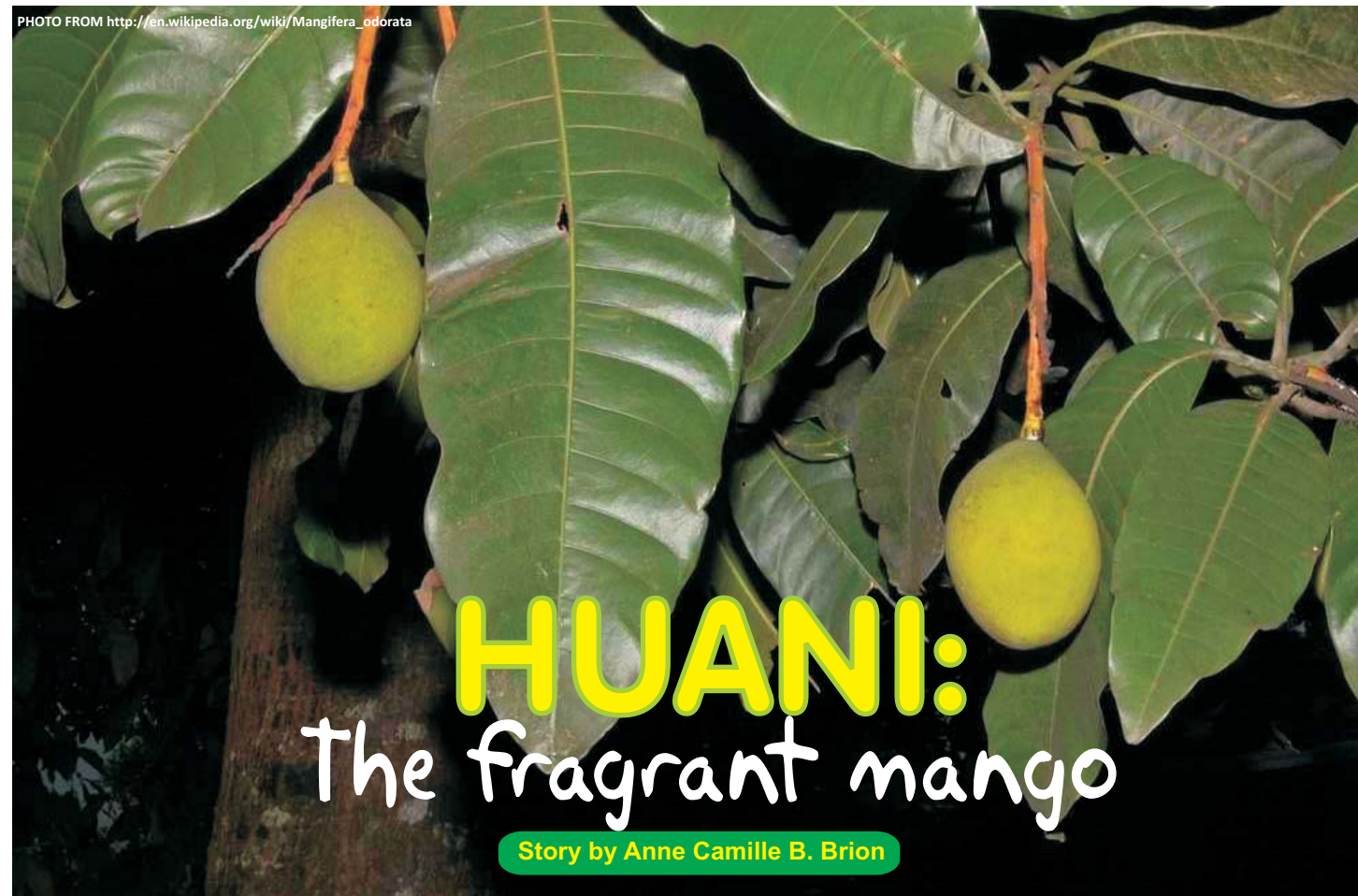
“Instead of planting just ornamental plants, we want to encourage more households to plant vegetables in their front and backyards so we can provide for our homes' basic needs, and we may be able to reduce our imports of vegetables,” said BAR Director Nicomedes P. Eleazar.

“It offers an opportunity for about 34.2 percent of the total household population or 5.2 million families of the country that live below the poverty threshold especially for families in the cities that cannot afford the high cost of basic needs as food,” according to a BAR-UPLB report.

OISCA, a Tokyo-based organization, has already been engaged in vegetable planting with its own farm situated in Tiaong, Quezon. It was established by Rev. Yonosuke Nakano even before it adopted EL. Upon adoption of the technology, OISCA added value to its vegetable farming resulting to the farm beautification and developed an increased number of young farmers interested in agriculture.

To date, other EL farms are demonstrated in several gardens of institutions, including schools, farm lot subdivisions, resorts, and exhibit areas. The first demo-site was established at the CA Agripark and at BAR premises. ### (Ma. Eloisa H. Aquino)

This was based from the articles published in Philippine Star and Manila Standard titled, “Edible landscaping helps produce imports and raises food security” (8 December 2013) and “Salceda pushes vegetable gardens” (10 December 2013), respectively.

PHOTO FROM http://en.wikipedia.org/wiki/Mangifera_odorata

Have you ever heard of the *huani* mango? Perhaps most of us are not familiar with this kind of fruit, but the people in Zamboanga Peninsula know it well.

Commonly called *kuwini*, Saipan mango, and fragrant mango *huani* (*Mangifera odorata*) is a lesser popular *Mangifera* species that bears edible fruits. It grows to about 15 meters high, shaped like an open canopy through its large green leaves. Making it more attractive as an ornamental tree for home gardens are its large, red flower panicles.

True to its name, the fragrant mango is characterized by its pungent smell. Its tree, as well as its flowers, emits a distinct odor that resembles a turpentine aroma. Some describe it as more sweet-scented as compared to other mango varieties. When ripened, its medium-sized rounded fruits have a bright orange to yellow flesh that is firm, slightly fibrous, yet juicy and sweet.

In some parts of the world, it has gained economic importance,

especially in areas where the *Mangifera indica* cannot be grown due to a very wet climate. *Huani* is usually consumed as a table fruit when ripe, while the green ones are made into pickles and sometimes used as condiments together with raisins, onion, and other spices. In traditional medicine, the bark of the *huani* is being utilized to treat people who are suffering from hystero-epilepsy, a form of hysteria that is accompanied with epileptic convulsions.

Countries that are found to be planting *huani* include Indonesia, Malaysia, Philippines, Thailand, and Vietnam, among others. In the country, it is being cultivated in the fertile lands of Zamboanga Peninsula, and consumed mostly by our Muslim brothers. It bears fruits twice in a year, usually in areas that have two dry seasons. Peak season occurs from April to July, and during these times, the price of *huani* becomes very cheap. Moreover, it was noticed that some of the matured fruits are left rotten, and put into waste.

To address these problems,

researchers from the Zamboanga Peninsula Integrated Agricultural Research Center (ZAMPIARC) of the Department of Agriculture (DA) implemented a project that will help increase the crop's market price, as well as reduce postharvest losses due to deterioration. Value-adding technologies and product development are seen as effective ways to address them. This prompted Ms. Norma Poblacion and Ms. Fe Sambulan to develop different products made out of the *huani* fruit.

Funded under the National Technology Commercialization Program (NTCP) of the Bureau of Agricultural Research (BAR), the project seeks to process the *huani* fruit into wine, puree, powder, candies, and pickles that are hoped to be among Zamboanga Peninsula's flagship processed foods. Through the project, the researchers will be able to: 1) determine the appropriate maturity period of *huani* that will produce the best products; 2) develop



Batanes regains crop productivity and profit with CPAR

Story by Diana Rose A. de Leon



With right farming technologies, significant positive changes can happen not only to the income of farmers, but to the community as a whole. This was the case of a Community-based Participatory Action Research (CPAR) project funded by the Bureau of Agricultural Research (BAR) and is being implemented by the Provincial Local Government Unit (PLGU) of Batanes.

Batanes is an island province located on the northernmost part of the country and characterized by its geographical isolation, unique topography, and unpredictable weather conditions. Agriculture and fishery-based livelihoods are the main sources of income of the residents. However, even though most of the farmers practice traditional and organic agricultural practices, there is a need to enhance the farming system to increase productivity and income.

The agricultural areas in Batanes are composed of two primary development zones: coastal and upland areas, which are utilized for growing crops and raising livestock. All agricultural lands are mainly rainfed areas and soil nutrient depletion is prevalent due to

insufficiency of appropriate amendments and nutrient replenishment strategies.

Given this state, a thorough understanding on the appropriate agricultural technologies to maximize productivity and harness the potentials of Batanes' unique environment was pushed through with the introduction of the CPAR project.

"We studied and analyzed the situation, and finally came up with the best fit interventions in the area," said Mr. Cesar Doroteo V. Hostallero, senior agriculturist of PLGU-Batanes.

The project aimed to accelerate the promotion of appropriate technologies of viable farming enterprises within the context of an integrated farming system to increase productivity and income of farmers with emphasis on organic production. Six farmer-cooperators from three sites in Chanarian, Basco; Sungahan, Mahatao; and Vatang, Ivana were tapped for the CPAR project.

The coastal areas

Coastal areas in Batanes are mostly planted with vegetables and other crops appropriate for a sandy loam to clay loam type of soil. The farmer's practice is to plant corn followed by vegetables and/or vegetable then fallow.

This led to insufficiency of vegetable supply especially during the months of March to June. Further aggravating the problem is the unpredictability of weather conditions which affect vegetable production. Another major concern is the limited knowledge on appropriate fertilizer sources and their application leading to soil fertility problems.

The proponents developed a package of technology (POT) that will address these problems. They promoted a year-round vegetable production by using appropriate vegetable varieties and conducted capacity building and technology demonstration on organic vegetable production, cultural management, and integrated nutrient management. Tomato, eggplant, sweet pepper, pole sitao, snap beans, *ampalaya*, cabbage, and carrots were the vegetables recommended to be planted in the project sites. Based on the results, eggplant was the most profitable crop followed by tomato, snap beans, *ampalaya*, cabbage, pole sitao, sweet pepper, and carrots, respectively.

Preparation of natural farming inputs including fermented plant juice (FPJ), fermented fruit juice (FFJ),

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oriental herbal nutrient (OHN) for pest management, fish amino acid (FAA), effective microorganisms (EM) and the gathering of indigenous microorganisms (IMO), vermicomposting, and recommended technologies on plot preparation, plant spacing, trellising, and mulching were among the topics discussed during the trainings which were conducted in support to the project. The knowledge gained was transferred not only to farmers in the project sites, but throughout the six municipalities of the province.

Increased yield was noticeable after the introduction of the POTs. From an average yield of 951 kilograms using farmers practice, it went up to 1,197 kilograms across the three project sites. When translated to income, from Php 9,444 using the farmers practice, the CPAR project sites marked an average income of Php17,463 with an increment of 84.9 percent.

In addition, the proponents trained the farmers on how to save their own seeds to avoid constant buying of seeds and to minimize the production cost of the farmers.

The upland areas

The farmers' practice in the upland areas is rootcrops-garlic-fallow cropping pattern. After harvesting the

an additional Php1,688 was added to the income of the farmers when they planted mungbean as a third crop. Another major benefit of the introduced cropping pattern was that the legumes help in rejuvenating soil fertility. In fact, it decreases the acidity of soil in the upland areas.

The Ivatans take pride on their garlic because it is organically-produced and is of good quality. They have two varieties-the Batanes red (has bigger cloves) and the Itbayat variety (smaller cloves like the Ilocos variety). The surplus supply is marketed outside the province specifically in organic markets in Metro Manila and Divisoria. However, due to the intrusion of imported garlic, the Batanes garlic industry is slowly showing a decline. This is why part of the project is strengthening the organic garlic production in Batanes by introducing appropriate and viable organic technologies.

Using the recommended POTs, from a 216 kilograms production, the garlic yield reached as high as 338 kilograms in a 1,000 sq. m. area. From a net income of Php1,648 in selling the garlic alone, it went up to Php5,221.

With the technologies adopted by the farmers, the province was able to produce **89.38 metric tons of vegetables which accounted for **13 percent** of the total requirement of the entire province.**

garlic, large parts of farms are left idle until the next rootcrop season. This accounted for a lost opportunity when farmers can make income during this time.

In response to this, the project introduced the camote-garlic-mungbean cropping pattern.

For two crop cycles, using the introduced cropping pattern, the total production in the upland areas increased to 310 kilograms per sq.m.

The CPAR farms posted a net income of Php 12,082 from Php3,665 using the rootcrops-garlic-fallow cropping pattern showing a 221.76 percent increase in income. As compared to allowing the land fallow,

The ripple effect

An additional 221 farmers from three CPAR sites adopted the POT for a year-round vegetable production in the coastal areas. The use of botanical pesticides and organic fertilizers and other organic practices such as vermicomposting are well accepted by the farmers. They have also seen the importance of practicing crop rotation, intercropping, and crop diversification. The camote-garlic-mungbean cropping pattern, on the other hand, was adopted by 166 farmers in the three CPAR sites. With the technologies adopted by the farmers, the province was able to produce 89.38 metric tons of

vegetables which accounted for 13 percent of the total requirement of the entire province.

To ensure that marketing of garlic and vegetable products are organized so that the farmers will get the most out of his produce, the proponents organized the farmers from the six municipalities into a Garlic and Vegetable Producers Associations with a provincial federation named as Batanes Garlic Producers Association (BGPA). "We also linked the small farmers to the established Barangay Food Terminal in the locality so that the consumers have easy access to vegetables and other crops," added Mr. Hostallero.

After the conduct of the project, the outputs from the CPAR pushed the PLGU-Batanes to intensify the implementation of organic food production projects in the province through the implementation of *Gulayan sa Barangay*, FAITH, Intensified Garlic and Mungbean Production, among other crop production initiatives. The PLGU allocated about certain percentage from its 20 percent development fund to support these projects through SP Resolution No. 81 and 131 in 2012 and 2013.

The CPAR program works on the premise that through the

participatory engagements of the project implementers, farmers, and other stakeholders, its impacts will not only be felt by the farmer-cooperators but also the community as a whole. ###

This article is based on the paper titled, "CPAR in Enhancing Productivity and Income in the Coastal and Upland Areas of Batanes," by the DA-Regional Field Unit II presented during the 25th National Research Symposium under the Development-Agriculture category.

For more information, please contact Mr. Cesar Doroteo V. Hostallero of PLGU-Batanes through his email: cvhostallero@yahoo.com

vinegar, jam, jelly, and fruit concentrates. ASC is also processing and packaging *bignay* and wild banana into wine and vinegar. These fruits are believed to have antioxidants and anti-cancer properties.

Lubeg jam serves as fillers for fruit-based baked products like *inipit*, custard cake, cupcake, and even jelly as fillers for doughnut.

To further promote and commercialize the products, three trainings on baking, wine making, and packaging were conducted. Nutrient, total acidity, and alcohol content analysis were determined. The nutrient analysis was made specific for *lubeg* jam and jelly; alcohol content for *lubeg* wine, *bignay* wine, and wild banana wine; while total acidity were conducted for *lubeg* vinegar, *bignay* vinegar, and wild banana vinegar.

The processing and production of indigenous fruits have gained impact not only to farmer-individuals but also to the community as a whole. "The project will alleviate the present socio-

economic condition of the farmers, creating additional livelihood opportunities for sectoral groups including farmers, women, out-of-school youths, and elderly," reported Dr. Ocampo.

The project is also considered as a productive enterprise to help alleviate poverty in Apayao.

To date, Elsie Sapad, a technology adopter in Luna, Apayao, is processing *lubeg* wine and vinegar. Likewise, the members of the Pudtol Agrarian Reform Beneficiaries Cooperative are packaging fruit-based products.

To sustain the supply of fruits, the college is producing seedlings under the National Greening Program. "We also link with the local government units, people's organizations, and other line agencies for collaboration," Dr. Ocampo explained. The project team also established linkages among buyers, traders, and processors. ###

For more information, please contact Dr. Ronald Ocampo of the Apayao State College through email: ascrnd@yahoo.com.



BAR is supporting the project of ASC on the product improvement and commercialization of indigenous fruits in Apayao which include *lubeg* wine and *lubeg* jelly.

Edible Landscaping featured...from page 3



In his welcoming remarks, BAR Assistant Director Teodoro S. Solsoloy mentions the importance of landscaping in agriculture. PHOTO:LPADILLA

texture and the design principles such as balance, contrast, emphasis, harmony, and scale and proportion are carefully planned and evaluated in order to create a landscape that is equally striking and functional.

"In edible landscaping, there are design matters that should be considered such as time, budget,

site characteristics, sun and shade, maintenance, and style," explained Mr. Tayobong.

After the planning, what comes next is the implementation phase which has four steps: 1) site clearing, 2) laying out, 3) hardscape construction, and 4) planting. Hardscapes are non-living elements utilized in the landscape such as rocks, cement, and steel while softscapes are the edible plants arranged like ornamentals to serve as accent, hedge, or ground cover.

"In the maintenance phase, all the practices involved in landscape maintenance and some of the applicable special practices in crop production are applied," said Ms. Aquino as she tackled on how to maintain the beauty and productivity of an edible landscape.

This phase is crucial as it sustains the beauty and productivity of the edible landscape. It covers proper watering, nutrient management, pest management,

pruning and thinning out, bagging, rationing, and harvesting.

Attending the seminar were representatives from the DA-Regional Field Units (RFUs), state universities and colleges (SUCs), cooperatives, and private sector. After the lecture, the participants were divided into groups and were tasked to design and present their own edible landscapes. ### (Leila Denisse E. Padilla)



During the workshop, the participants are divided into groups to design their own edible landscapes. PHOTOS:LPADILLA

EXPLORING THE POTENTIAL of *Apayao's indigenous fruit*

Story by Ma. Eloisa H. Aquino



PHOTO COURTESY OF ROCAMPO/ASC

Lubeg
is a cherry-like
indigenous fruit
that can be
found in Apayao.

Exploring the wild-growing plants has been one of the initiatives of the government now particularly the agriculture department. There have been programs and projects on the protection and cultivation of indigenous plants. Research efforts are being pulled into in order to exploit the potentials of these wild, indigenous crops in the country. “Farmers are encouraged to produce fruit crops, thereby promoting sustainable agriculture in the uplands,” said Dr. Ronald O. Ocampo of the Apayao State College (ASC).

The province of Apayao houses some of the country's indigenous crops including: *lubeg*, *bignay*, *bignay kalabaw*, *calumpit*, *saging matsing*, other than the fruit-bearing trees like *durian*, *marang*, *lanzones*, *rambutan*, pineapple, mangosteen, coconut, *santol*, among

others. Given this, Apayao is dubbed as the “Cordillera's last frontier for nature's richness”. With the abundance in indigenous and wild growing fruits, the province of Apayao is envisioned as the prime “Agroforestry Center in the North”.

According to Dr. Ocampo, growing of fruit crops has various benefits including soil protection against erosion due to its profuse and widely distributed roots. With wider canopies, fruits crops are considered to have longer productive life. “They have wider tolerance to adverse soil and climatic conditions such as drought, typhoon, and strongly low ph,” Dr. Ocampo added.

Funded by the Bureau of Agricultural Research (BAR), the ASC is currently working on the product improvement and commercialization of indigenous fruits in Apayao. One promising indigenous fruit in Apayao is called “lubeg”.

Lubeg (*Syzygium lineatum*) belongs to the family *Myrtaceae*. It is an erect, medium fruit tree usually 4-5 meters in height, with its leaves usually ovoid to elliptical measuring about 8-10 cm. The leaf possesses a sour taste. Forty percent of total production is in Apayao and is mostly found in the Cagayan Valley with an estimated 1,000 lubeg trees grown.

Lubeg are cherry-like fruits with thick and fleshy, spongy, leather or brittle rind, oblong (ovoid or ellipsoid), and can grow up to 13 mm long. “Fruits are in cluster, whitish in appearance, and gradually turn from red to violet as they ripen. The fruits are considered to be highly perishable,” ASC researchers described.

Different processing technologies for *lubeg* were developed which include wine,



Optimizing the potentials of *kadyos* in CamSur

Story and photos by Leila Denisse E. Padilla

Pigeon pea, locally known as *kadyos*, is a reliable legume known to grow amidst drought, fixate nitrogen from air to soil, keep the soil compact, and thrive with low farm inputs. As a multipurpose crop, pigeon pea is utilized for human food, animal feed, and fuel wood.

Seeing the potentials of *kadyos* in enriching the soil, increasing productivity, and alleviating food insecurity, the Central Bicol State University of Agriculture (CBSUA) is conducting a three-year project titled, “Pigeon Pea (*Cajanus cajan* (L) Millisp.) Research and Development Project”, in collaboration with the Department of Agriculture (DA), local government unit (LGU), and the Bureau of Agricultural Research (BAR).

Most suitable varieties of *kadyos* in CamSur

The project team led by Dr. Fe Perlas, professor II of CBSUA, established five sites located in CBSUA (Crop Science and Airport Bridge areas), Ocampo, Tigaon, and Pamplona which were planted with six varieties of *kadyos*, namely ICPL

88039, ICP 87119, ICEAP 00040, ICP 7035, ICEAP 00932, and ICPL 88034.

After evaluating the recorded physiological characteristics and yield parameters, it was found that “of the six varieties tested, ICPL 88034, ICPL 88039, and ICP 7035 performed better over the others...in terms of height, days to maturity, number of branches, and in the yield parameters,” as stated by the proponents.

“After identifying the varieties that are most suitable in our province, these varieties were used in the next study which aimed to determine if pigeon pea can control soil erosion,” explained Ms. Melani Abalayan, study leader and researcher of CBSUA.

Reducing soil loss through *kadyos* hedgerows

Three study sites in CBSUA (rice-based and vegetable-based) and Pamplona

(coconut-based) were established with control treatment (no hedgerows) and two experimental treatments using an early maturing variety (ICPL 88039) and a medium maturing variety (ICP 7035) as hedgerows.

According to the rainfall and soil loss data, the two sites in CBSUA have had more rainfall and number of rainy days causing soil loss than the site in Pamplona.

According to the findings, the highest soil losses and runoffs were found in the control treatments

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The BAR documentation team talks with Mr. Mario Emmanuel Napoles, farmer cooperador, about his experiences in the project.

MAKAPUNO: not your ordinary nut

Story and photos by Patrick Raymund A. Lesaca

investors, and entrepreneurs interested in this crop, and thus becoming a lucrative business.

The Makapuno Road Map 2010 prepared by the Department of Science and Technology (DOST), indicated that the total demand for *makapuno* meat is estimated at 4,209,732 kilograms per year against total production of only 215,202 kilograms per year. The gap of roughly 3.9 million kilograms per year will require 7,900,000 nuts. A total of 800 hectares have to be planted to address the said gap and to ensure stable supply.

In a published report prepared by Dr. Erlinda Rillo of the Philippine Coconut Authority (PCA) in Albay, it was recommended that in order to meet such demand, an estimated 133,151 Embryo-Cultured Makapuno (ECM) seedlings are needed to develop the competitiveness of the food and non-food products, and the only way to mass produce *makapuno* is through embryo culture, which was believed to be developed by the late Dr. Emerita V. de Guzman of the University of the Philippines Los Baños (UPLB) in 1960. ECM involves the excising of the embryo and growing it in a culture medium permits the successful development of seedlings from *makapuno* nuts.

Increasing ECM production

To boost the production of *makapuno* in the countryside, the Department of Agriculture – Regional Field Unit IVA (DA-RFU-4A) through the Southern Tagalog Integrated Agricultural Research Center (STIARC), responded to the challenge by

increasing ECM production through a project, “Productivity Enhancement and Development of Makapuno-based Products” which was funded through the National Technology Commercialization Program (NTCP) of the Bureau of Agricultural Research (BAR).

The objectives of the project were to: 1) increase the production of ECM through improved package of technology and develop makapuno-based-products; 2) improve the existing tissue culture laboratory and processing room; 3) maintain the existing one-hectare makapuno demo; and 4) produce 2,000 germinated ECM at the end of two years. The project was conceptualized in June 2010 and was completed in 2013.

Project proponents led by Ms. Digna Narvacan, STIARC manager, together with Daisynette Manalo, Cynthia Leycano, and Fe Lupig, reported that production of ECM planting materials was done in the station's laboratory which would become the source of quality planting materials for *makapuno* not only in Batangas province, but also in other neighboring provinces in Region IVA and in other regions as well. The laboratory protocols were also modified resulting in an increased production of ECM from 60 to 89 percent. The mortality rate likewise dropped from 40 to 11 percent. Further, as the result of the technical and financial assistance provided by DA-BAR, total nuts harvested increased by 443 percent.

Project impact

With the modified protocol, which is a result of the project, the *in vitro* culture was



Cynthia Leycano, agriculturist II from STIARC, demonstrates how to extract the embryo from the *makapuno*.



Samples of Embryo-Cultured Makapuno (ECM) plantlets



AS THE RESULT OF THE TECHNICAL AND FINANCIAL ASSISTANCE PROVIDED BY DA-BAR, TOTAL NUTS HARVESTED INCREASED BY 443 PERCENT.

shortened from 14 months to 10 months. The cost of production was also reduced by as much as 20 percent. Since the project started in December 2010, a total of 7,748 nuts were harvested, of which 6,819 embryos were recovered. Twelve percent of the embryos were either non-*makapuno*, aborted or damaged during excision. However, there was an improvement in the percentage embryo germinated from the total embryo recovered from year 1-3. As of May 2013, there were 5,135 ECM planting materials (different stages) produced at STIARC.

In terms of product

development, the project developed three food products from *makapuno* (*makapuno* strings, balls, powder) and one non-food product (*makapuno* soap).

The adoption of the embryo-cultured technology is an example of successful technology dissemination. It is a technology that has been optimized and successfully adopted. The dissemination and demonstration of this technology, through the project, has resulted in the high demand for these ECM materials. Proponents concluded that ECM production is feasible and economically viable, and therefore highly recommended for farmers' adoption. ###

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“Maka puno” is a Filipino vernacular loosely translated as “almost full”. Conversely, when one speaks of *makapuno*, it refers to a mutant coconut because of its genetic abnormality; and it is characterized by its soft endosperm and by how much it fills the nut.

The *makapuno* phenomenon is believed to be governed by a single recessive factor and the palm which occasionally bears *makapuno* nuts is heterogeneous for the character. These coconuts which do not germinate *in situ*, have normal embryos which can be extracted and cultured *in vitro* where they will germinate normally to give rise to palms with high makapuno coconut yields. The *makapuno* industry however, is just a small portion of the whole coconut industry. Area planted is only 577 hectares while area planted to coconut is 3.56 million hectares. (Batalon, 2009).

The increasing demand for *makapuno* meat as the main ingredient in many food products like sweets, candies, desserts and ice cream, and its use in non-food products like cosmetic lines, lotions and soaps, have led farmers, private