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# Organic Sugar from Nipa Palm

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# GOING ORGANIC

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

In the aftermath of the Green Revolution, the Philippines learned that adopting chemical-based agriculture has a detrimental effect on sustainable approaches to food security and income. In the 1980s, the gains from this kind of agriculture was called "profits from poison". Since then, enlightened institutions and citizens have committed to organic agriculture or OA as a means to offset the effects of "chemical crops".

In the simplest terms, organic farming is basically farming without the use of synthetic chemical inputs and non-renewable energy resources. It seeks to increase farm productivity, reduce environmental degradation and prevent the depletion of natural resources and, at the same time, protect the health of the general public as well as reduce the cost of imported farm inputs.

In 2010, the Organic Agriculture Act was promulgated to provide for the development and promotion of organic agriculture in the country. Under this Act, the Bureau of Agricultural Research (BAR) was tasked as the focal agency for creating and organizing an Organic Agriculture Research, Development and Extension Network composed of research and educational institutions, local government units (LGUs), non-government organizations (NGOs), and recognized associations or interest groups.

Since then, we have intensified activities for identifying, prioritizing, and implementing organic agriculture R&D projects and activities that will have high impact. Results from 11 OA projects funded through the Organic Agriculture R&D Program of BAR are featured in this issue of the ***BAR R&D Digest***.

Integrated Pest Management (IPM) has to be harmonized with organic agriculture. We are now looking at IPM for organic agriculture that does not use chemical pesticides. The article we have is about the development of pest management approaches for the control of insect pests and diseases of seven vegetables. Another interesting article is about a soil fungus that is better known as a biofertilizer inoculant but can also serve as a bio-control agent against soil-borne diseases.

On the development of organic fertilizers, two articles discuss improvements in organic fertilization technology: one for mungbean in rotation with rice, and the other on improved Bio-N technology. Two others describe the production of liquid organic fertilizers from plant and fruit extracts, and the development of technology for pelletized organic fertilizer from animal manure.

Participatory breeding of organic vegetables by farmers is being promoted while another addresses the establishments of seed supply for organically-grown fruit crops in Davao City.

Indigenous agriculture is naturally compatible with organic agriculture. One article is about how one community is utilizing naturally-grown Nipa Palm for the production of Nipa Palm sugar. Another article describes the use of local forage for feed and herbal medicinal plants for various ailments in cattle production and feed specifically for poultry.

We have made much headway but organic agriculture in the Philippines still has a long way to go. *Marami pa tayong kakaining* organic rice, so to speak. With Filipinos becoming increasingly aware of the benefits from organic farming and chemical-free food products, the Philippines has the potential to be a lead country in organic agriculture in the region. What we have to know are our strengths and advantages in organic agriculture in order to penetrate the foreign market. We can play our cards right and research in organic agriculture can be the game-changer in this endeavor. ###


photo from: www-maguzz-com

# ORGANIC AGRICULTURE for sustainable, healthy food

*"all agricultural systems that promote the ecologically sound, socially acceptable, economically viable and technically feasible production of food and fibers."* (R.A. 10068)

BY PATRICK RAYMUND A. LESACA

photo from: www.raweva.com

Advocating the Organic Agriculture (OA) is the country's proactive response to food sustainability and healthier living. It promotes alternative farming system that totally eradicates the use of excessive chemical-based fertilizer, which is harmful both for the farmers and the environment.

It is in this paradigm that the Philippine government enacted into law Republic Act 10068 otherwise known as the Organic Agriculture Act of 2010. The International Federation of Organic Agriculture Movements (IFOAM) defined OA as "all agricultural systems that promote the environmentally, socially, and economically sound production of food and fibers. These systems take local soil fertility as a key to successful production. By respecting the natural capacity of plants, animals and the landscape, it aims to optimize quality in all aspects of agriculture and environment. Organic agriculture dramatically reduces external inputs by refraining from the use of chemo-synthetic fertilizers, pesticides and pharmaceuticals. Instead, it allows the powerful laws of nature to increase both agricultural yields and disease resistance."

In R.A. 10068, OA also covers soil fertility management, varietal breeding and selection under chemical and pesticide-free conditions, the use of biotechnology and other cultural practices that are consistent with the principles and policies of RA 10068.

**Role of BAR**

The Bureau of Agricultural Research (BAR) is tasked under Section 20 of RA 10068 to lead and coordinate among executive agencies of government like agrarian reform; science and technology; education; interior and local government including strategic agricultural-based state universities and colleges (SUCs), and private organizations to develop, enhance and support, and consolidate activities related technologies for the formulation and implementation of a unified and integrated organic agriculture RDE plans and programs from the national to the field level.

The organic agriculture RDE plans and programs include the following thrusts: 1) research, development and commercialization of appropriate, innovative and viable organic agricultural technologies; 2) nationwide promotion of developed and commercially-viable biodegradable farm wastes and by-products through various extension strategies to accelerate the production, use, and distribution of organic fertilizers; and 3) conduct research for market development, policy formulation, regulation and certification.

Another distinct feature of the Act is the creation of the Organic Agriculture RDE Network, which has been organized by BAR. The network is composed of research and educational institutions, local government units (LGUs), non-governmental agencies, and recognized association of organic fertilizer manufacturers and distributors, agricultural engineers, agriculturists, soil technologists, farmers group and associations. Furthermore, national, regional and provincial organic RDE centers are organized, established, and integrated as major components of the existing centers of the Department of Agriculture, Department of Science and Technology, Department of Environment and Natural Resources, SUCs, and LGUs.

**Current OA Interventions of BAR**

As of 2014, there have been 33 projects funded and supported, of which 7 projects are completed.

The highlights of the completed projects were focused on recycled materials, fertilizer production, and enhanced farming systems.

BAR continues to adhere to the principles of the Act towards the implementation of its high-impact OA R&D plans and programs, and looks forward to the production of healthy and pesticide-free agricultural products. ###

# Corn cobs:

## Extending organic practices to fertilizer use

BY EPHRAIM JOHN J. GESTUPA

Just recently, we have seen the dawn of organic products sweeping through our grocery aisles and taking over just about every health-related conversation we have with our moms and titas. Yet the word "organic" is also a much talked-about topic in the aspect of fertilizer use.

In an attempt to transform our diets with healthier, organic food, scientists have traced food to the farm, back to that moment that our hardworking farmers plant a seed to the ground. It is at this stage that "organic" is also now redefining old methods.

One of the nutrients needed by every crop for it to grow and produce yield is nitrogen. One source for such nutrient is the soil. It is needed by every plant in order for it to undergo photosynthesis, produce sugar, and develop proper plant structure. Excessive amounts of the element can lead to water pollution while the lack thereof will result in low plant yield. More often than not, the latter is commonly experienced by our country's corn farmers. In order for them to sustain the much needed nitrogen in their soil, farmers make use of fertilizer. Fertilizer takes up a significant portion of a farmer's expenses.

Due to the great amount of expenditure that comes with purchasing the sufficient amount of inorganic fertilizer for hundreds of hectares of corn fields, it is not feasible for farmers to depend on it alone. In light of this, the Philippine government has made it a goal to encourage farmers to practice organic farming in complementation or in combination with the use of organic and inorganic fertilizers.

One example of organic fertilizer product that is being used by Filipino farmers is Bio-N, a fertilizer powder that contains two species of nitrogen-fixing bacteria. According to general feedback from corn farmers, Bio-N can preserve soil productivity as it sustains the need for nitrogen until harvest time. Its use results to better yield without the the soil losing too much nitrogen. Applying Bio-N, when planting corn, also decreases in the incidence of pests including corn borer and earworm.

Before Julieta A. Anarna's research on using corn cobs as a carrier for Bio-N as part of her study, the organic fertilizer was being mixed with large volumes of soil and wood charcoal as these ingredients serve as Bio-N's carrier. The Bio-N inoculants and concentrates are being mass produced at the National Institute of Microbiology and Biotechnology - University of the Philippines Los Banos (BIOTECH-UPLB). The Bio-N concentrates are distributed to the accredited Bio-N mixing plants only where it is mixed with its carriers while the Bio-N inoculants are the ready to use biofertilizer for rice and corn.

Anarna's research recognizes the sheer amount of organic waste, particularly the corn cobs, produced during harvest and takes advantage of this by looking into how the waste can help make fertilizer carrier production more efficient. Anarna is a researcher from BIOTECH-UPLB and one of her researches was funded by the Bureau of Agricultural Research (BAR) under its Organic Agriculture Program. It is titled "Evaluation and Utilization of Organic Waste (Corn Cob) as Substitute for Carrier in Bio N™ Production".

Anarna's research is mainly about looking into how corn cobs can serve as a viable substitute for the wood charcoal as one of the raw materials. At the early stages of her research, she prepared three carrier combinations consisting of different proportions of pulverized corn cobs, soil, and charcoal. Each combination was subjected through tests that determined how long they can stay sterile. Results came back showing contaminants developing on all the mixtures. Anarna then decided to try converting the pulverized corn cobs into charcoal before the ingredient was mixed with soil. The pulverized corn cobs first underwent sterilization for three consecutive days then through the process of charcoaling. After the procedure, the corn cobs were then mixed with soil. According to the research's conclusions, the "carrier using charcoal corn cobs had the physical characteristics [and] water holding capacity suitable for the growth and survival of [nitrogen-fixing] bacteria". The effectiveness of the new corn cob mixture was also measured based on the growth and yield produced during field experiments and the amount of expenses such a mixture can save compared to previous versions.

The study was able to develop a new Bio-N carrier that promotes the use of organic fertilizer and lessens the dependence of farmers on conventional fertilizer. This comes just in time as the Philippine government is adapting an organized clustering approach for both rice and corn national programs. With farmers being organized and connected to groups, demand has increased for both corn and rice industries. Mixing plants that complete the process of manufacturing Bio-N has also saved a huge chunk of their expenses now that the raw material for charcoal production is more accessible.

Anarna and her team are now extending the knowledge they have discovered through this research and are now promoting the use of Bio-N and corn cobs as carriers all over the country. ###

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References:

1. Anarna, J.A. (2013). Evaluation and Utilization of Organic Waste (Corn Cob) as Substitute for Carrier in Bio N™ Production. DA-BAR.
2. Pau Vall, M. and Vidal, C. (n.d.). Nitrogen in agriculture. Retrieved on Nov 2, 2015. Retrieved from: http://ec.europa.eu/agriculture/envir/report/en/nitro_en/report.htm

# Promoting BIOFERTILIZERS for sustainable, profitable agriculture

BY DIANA ROSE A. DE LEON

Farmers get a higher profit for their produce if they can lower the cost of production. One of the means to do this is to reduce their spending on fertilizer. Fertilizers account to about 30-40 percent of the total production cost in agricultural crops. The higher the cost of fertilizers, the higher the production cost; and farmers cannot do away with fertilizer as it contributes a huge percent increase in crop yield.

This is why it is encouraged to use alternatives for expensive chemical fertilizers. One option is the use of biofertilizer. It is inexpensive, environment-friendly, and it helps in sustainable management of soil health, cutting down the use of chemical-based inputs. Biofertilizer utilizes microorganisms to increase the availability and uptake of mineral nutrients of the plant.

**Biofertilizer technologies**

The National Institute of Molecular Biology and Biotechnology- University of the Philippines Los Baños (BIOTECH-UPLB) has progressively developed innovations and technologies that greatly impact the agricultural biotechnology landscape of the country. One of its niche contributions and continually being pursued is the development of microbial-based fertilizers.

Currently, BIOTECH-UPLB offers a wide array of biofertilizer technologies. There is the ***Biogroe***, a plant growth promoter for vegetables and ornamentals; ***Bio-N***, a microbial-based fertilizer that supplies nitrogen and enhances growth of rice, corn, and vegetables; ***Brown Magic***, a growth enhancer and biocontrol of root diseases of various orchid species; ***BioGreen***, ***BioQuick,*** and ***BioFix*** which are microbial inoculants for the bioconversion of crop residues and agro-industrial by-products into bio-fertilizers; ***Cocogroe***, a growth hormone from coconut water that enhances and promote growth of orchids, vegetables, and ornamentals; ***Mycogroe***, a tree vitamin to enhance growth and development of pines, eucalypts and dipterocarps; ***Mycovam***, a soil-based biofertilizer for fruit trees, agricultural crops, reforestation species, and ornamentals; ***Nitroplus***, a nitrogen supplement for legumes such as peanut, stringbeans, soybean and mungbean; and ***Vesicular Arbuscular Mycorrhizal Root Inoculant*** (VAMRI) which promotes growth of agricultural and horticultural crops, trees, and ornamentals.

Despite the massive technology promotion on bio-fertilizers such as Bio-N and Nitroplus, there are still end-users who are doubtful to its effectiveness in increasing crop yield. There are also bio-fertilizers that despite its effectiveness are still not commercially well-known.

One biofertilizer that proved to be effective but still lacks on technology promotion is VAMRI. Hence, Dr. Marilyn B. Brown, deputy director of BIOTECH-UPLB, proposed a project to the Bureau of Agricultural Research (BAR), that aims to commercialize VAMRI technologies.

**VAMRI**

VAMRI is one of biofertilizers available that is found to be effective for many agricultural and plantation crops including rice, mungbean, peanut, corn, high-value fruits and vegetables, onion, soybean, and ornamental plants among others.

It is a chopped dried corn roots infected with arbuscular mycorrhizal (AM) fungus, either *Glomus mosseae* or *Glomus fasciculatum*. AM fungi help facilitate phosphorus uptake in plants and enhanced pathogen protection. VAMRI serves as biofertilizers and biocontrol agents of soil-borne diseases of different crops, thus, depending on the soil fertility and condition, it can replace 50-100 percent of chemical fertilizer and pesticide requirements of the crop.

The research study of Dr. Brown focused on promoting VAMRI technologies in Regions 4A and 4B in different cropping and plantation systems. It was found that majority of the respondents have no knowledge on the use and




application of biofertilizers, thus, the project included an intensive capacity building component including trainer's trainings and lecture series for farmers, and dissemination of IEC materials on VAMRI and other biofertilizer technologies.

In terms of establishing the effectiveness of VAMRI technologies in Regions 4A and 4B in different cropping and plantation systems, the project team prepared researcher-managed demonstrations (RMD) and farmer-managed field demonstrations (FMD). The project used VAMRI in combination with BioGreen and Nitroplus for legumes as part of the intervention.

The RMD were for *ampalaya*, stringbeans, soybean, corn, and eggplant and were established in Region 4A and in BIOTECH. It is found that there was growth increment and larger fruits using the VAMRI and BIOGREEN treatment for the non-leguminous crops, and Nitroplus for legumes. The crops treated with biofertilizer technologies have yield comparable with the plants fertilized with either the half recommended rate of chemical fertilizer (RRC) or full RRC.

On the other hand, the FMD set-ups were established in different provinces in Regions 4A and 4B. An FMD set-up in Bay, Laguna for *ampalaya* plantation showed that there were no difference in yield if fertilized with biofertilizer or if the RRC was used, thus, the farmer can save up to 50-100 percent if VAMRI technologies were used. Another set-up in Batangas for corn exhibited a yield comparable to farmer's practice (FP) using full RRC, saving the farmers from buying expensive chemical inputs if biofertilizers were used.

These results only proved that biofertilizer is effective and can supplement the fertilizer requirement of crops. The substitution of chemical fertilizer with biofertilizer is not only economically-beneficial for the farmer but also helpful in maintaining health and fertility of soil. ###

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References:

1. BIOTECH-UPLB. Biofertilizers. Retrieved from: biotech.uplb.edu.ph/index.php/en/products/biofertilizers
2. Javier, P.A and Brown, M.B. Bio-fertilizers and bio-pesticides research and development at UPLB. Retrieved from: www.agnet.org/htmlarea_file/library/20110712070234/eb602.pdf
3. Mojica-Sevilla, Florence. (2006).The Philippine fertilizer industry. Retrieved from: pinoyagribusiness.com/forum/agrinews/the_philippine_fertilizer_industry-t950.0.html;wap2=
4. Price of fertilizer to increase production cost of agriculture by 0.15 percent. Retrieved from: nap.psa.gov.ph/factsheet/pdf08/FS-200808-ES1-02.asp#1
5. Sikes, Benjamin A. (2010). When do arbuscular mycorrhizal fungi protect plant roots from pathogens? Retrived from: www.ncbi.nlm.nih.gov/pmc/articles/PMC3001584

# Standardizing procedure
## for high-quality liquid organic fertilizers

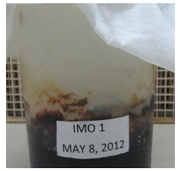
BY ANNE CAMILE B. BRION












Venturing into organic farming practices is linked with producing foods that veer away from using synthetic and chemical fertilizers. An enormous part of going into organic is the use of organic fertilizers which is necessary for plant growth. To save from the expensive chemically-induced fertilizers which pose negative impact on human health and the environment, farmers resort to making fermented preparations from various plants and fruits. Using biological resources such as leaves, fruits, and other plant parts that are readily-available in the farms, farmers are able to produce alternative low-cost liquid fertilizers that are beneficial for soil and crop nutrition as well as prevention of plant diseases. These are commonly called fermented plant extracts (FPE), fermented fruit extracts (FFE), and indigenous microorganisms (IMO).

**Improving protocol for biological extracts and concoctions**

Through the years, the use of fermented plant extracts and other biological concoctions as organic fertilizers has gained positive outcomes and benefits for the farmers' produce. However, the different practices of each farmer result to varying expected quality of fertilizer products. "The claimed effects on plants are basically anecdotal. Very limited scientific experiments are being done in the Philippines and the mode of action is not well understood. The quality of locally-made products is not controlled. We do not know if some of the microorganisms in the concoctions may even be pathogenic," said Dr. Mannix S. Pedro, university researcher from the National Institute of Molecular Biology and Biotechnology (BIOTECH) of the University of the Philippines Los Baños (UPLB).

For this reason, researchers from the UPLB-BIOTECH and the Agricultural Systems Cluster of the College of Agriculture led by Dr. Pedro implemented the project, "Protocol Improvement and Product Development of Liquid Organic Fertilizers from Fermented Plant Extracts and Other Biological Concoctions." With funding support from Bureau of Agricultural Research, the project aimed to develop a science-based protocol in the formulation of liquid organic fertilizers made from plant and fruit extracts. "The project evaluated the microbial and chemical properties of different botanical concoctions to help the farmers standardize their own biological extracts. By doing so, farmers can improve their current practices that would result to more uniform and high quality biological extracts," Dr. Pedro explained.

In the project, science-based interventions were conducted to evaluate the botanical preparations based on the actual fermentation techniques of local farmers, including the ingredients that they are using. Fermentation set-ups for the biological concoctions were subjected under evaluation using madre de cacao leaves for FPE, banana peelings for FFE, and mixture of cooked rice and molasses for IMO.

For the fermentation process of plant extracts, madre de cacao leaves were allowed to ferment for 30 days with the aid of brown sugar, distilled water, and FPE obtained from previous set-up as inoculum. As for the fruit extracts, the same procedure was used with banana peelings but FPE and IMO obtained from previous set-up were used as inoculum. On the other hand, to encourage the growth of naturally-occurring indigenous microorganisms (IMO), cooked rice was inoculated with white fungus and was added with molasses of different concentrations after three days. Fermentation of the mixture took place for 21 days. Sampling for each set-up was conducted every three days to determine pH level, population dynamics using molecular tools (denaturing gradient gel electrophoresis (DGGE) technique), viable microbial plate count, and chemical analysis.

Results showed that different groups of microorganisms exist in the biological concoctions. Studying their dynamics is important in determining the peak of production of certain enzymes, hormones, and other important compounds during the fermentation process which are necessary for plant growth.

The biological concoctions were likewise found to exhibit some fungi isolates that have functional characteristics. These include phosphate solubilizers from IMO, as well as nitrogen-fixers, indole acetic acid producers, and potassium solubilizers from the biological extracts–all of which aid in plant nutrition and growth. In addition, chemical analysis support that the modified mixing protocol and inoculation employed in the project were found to be helpful in improving the quality and standard of the biological extracts due to the observed improvements in the micronutrient content in FPE and higher nutrients yielded in IMO production.

To initially determine the effects of the biological concoctions using the modified protocols, experiments under screenhouse conditions were conducted. Different formulation of IMO was applied on hot pepper plant and revealed that plants inoculated with IMO showed comparable plant height over the untreated plant. On the other hand, results showed that the application of IMO with 100 percent molasses initiated the earliest flowering for bush sitao. Combining vermicompost and IMO with 100 percent molasses when applied to the bush sitao obtained the highest total marketable pod yield per plant, and at the same time, the lowest total non-marketable pod yield which means that it had the least rejects among the other treated plants.

With standardized procedure and more precise ingredients and methods of production, the farmers are equipped with the right formula that they can apply to make their own organic fertilizer concoctions within the comfort of their own homes. Aside from becoming an additional source of income, the development of liquid organic fertilizers from plant and fruit extracts can greatly contribute in preserving the environment and in lessening the cost of agricultural inputs. Due to the promising potentials of the project, the second phase is being developed which focuses on studies related to the production and efficacy testing of the liquid organic fertilizer products. ###

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# Organic sugar from Nipa Palm

BY MA. ELOISA H. AQUINO


Nipa Palm (*Nypa fruticans*), a species of palm that grows along the coastlines and estuarine habitats, is commonly used in the Philippines as roofing materials for *bahay kubo* or processed as vinegar (*sukang paombong*) or wine (*laksoy*). Recently, a group of farmers in Surigao del Sur are now engaged in producing a natural sweetener from Nipa Palm.

Nipa Palm sugar, with lower glycemic index, is almost like the coco sap sugar, granulated from the sap of the Nipa Palm. Given its promising potential and the increasing demand for organic products, the Foundation for Rural Enterprise and Ecology Development of Mindanao (FREEDOM), Inc. is implementing a project that aimed to provide livelihood opportunities to coastal communities and to increase the income of tappers and wine processors in Barangay Agsam, Lanuza, Surigao del Sur.

"The Nipa Palm is naturally-grown and the sugar produced from its sap. This can be considered entirely an organic product since according to USDA National Organic Program (NOP) an organic produce and other ingredients should be grown without the use of pesticides, synthetic fertilizers, sewage sludge, genetically modified organisms, or ionizing radiation," explained Mr. Antonio Peralta, executive director of FREEDOM, Inc. He added that the process of producing Nipa Palm sugar is done naturally since this has been tapped as sap from the Nipa Palm. The sap is then converted into syrup, which is then directly cooked until it becomes granulated sugar.

Funded under the National Organic Agriculture Program and coordinated by the Bureau of Agricultural Research (BAR), through its National Technology Commercialization Program (NTCP), the project, "Adoption and Utilization of Nipa Palm Sugar Processing Technology (NPSPT) in the Municipality of Lanuza, Surigao del Sur" sought to improve the Nipa Palm sugar product, contribute to the mangrove rehabilitation and protection, and strengthen the local People's Organization. Components of the project include organizing innovative sap processing technology training, packaging, labeling, and market linking.

A Memorandum of Agreement (MoA) between the Sitio Ipil Wine Makers Association (SIWA) and the Municipality of Lanuza was signed wherein the latter will have the full marketing contract to purchase the Nipa Palm sugar produced by SIWA members for resale to other interested buyers. Present as witnesses were Ms. Evelyn H. Juanillo and Mr. Alvin L. Fontanil of BAR and Dr. Lope Santos of the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA).

SIWA, the chosen project's beneficiary, in partnership with FREEDOM, Inc., will be managing the common service processing facility responsible in producing high quality Nipa Palm sugar. The facility that produces the sugar on a weekly basis, houses a mechanical dryer that can process 40 kilograms of sugar per batch. "Nipa Palm sugar production is seasonal with the productive months starting from November to June while the lean months are from July to October" said John Largo who oversees the operations of SIWA.

"The project implementers are now planning to expand the facility to increase the production rate and further improve the quality of Nipa Palm sugar. FREEDOM, Inc. and SIWA embarked on a study mission in the coco sugar processing facilities in South Cotabato and Davao del Sur to see the best practices in coco sugar production. The production processes for both Nipa Palm sugar and coco sugar are similar. The expansion of the technology to other barangays was also discussed," Ms. Juanillo shared.

To date, the Nipa Palm products were able to penetrate in Eco Stores, a national chain of stores in Davao City and Cagayan de Oro. "Other local coffee shops have shown interest in using Nipa Palm sugar for different varieties of coffee that they sell," Mr. Peralta added. Presently, Nipa Palm sugars are packed in 150 grams stand up pouches. These are sold at PhP 150.00 per pouch. The product received a favorable response during the recent Davao Agri Trade Expo (DATE), held on Sept. 25-27, 2015 at SMX Global in Lanang, Davao City. This event is one of the major agri trade fairs in the country drawing both local and foreign buyers.

There is a large demand for natural sweeteners in the foreign market including United States and Europe. The growing consumer preference towards natural sweeteners is manifested by the increased market shares of different natural sweeteners such as coco sugar, Stevia, Nipa Palm sugar, among other products.

Based from the research undertaken by FREEDOM, Inc., the Philippines has the third largest population of Nipa Palm Tree s in the world. The other two countries, Indonesia and Thailand, have developed the Nipa Palm sugar into large industries.

SIWA members also attended series of training as well as capacity building activities facilitated by FREEDOM, Inc. to further improve their skills on Nipa Palm sugar processing and farm production management. Terrencio Orillaneda, a member of SIWA commented that the training helped them develop their production of Nipa Palm sugar into a micro enterprise. Other members also recognized the value of the training provided to them as it helped them manage their association in a professional manner.

"We have established a 'Farmer Climate Field School' to support the good agricultural practices that we are introducing in the project. The presence of production standards and proper training for farmers which was provided under the project, will improve the quality of Nipa Palm sugar," Mr. Peralta said.

During a site visit at the established one-hectare demo farm of Nipa Palm, SIWA members demonstrated the actual tapping of a fresh Nipa sap and also provided a cooking demonstration process of the fresh sap to form granulated sugar. A portion of the proceeds from the sale of Nipa Palm sugar will be used to establish a mangrove rehabilitation fund for the areas that have depleted mangrove. This was agreed with the members of SIWA according to Fritz Escudero, project coordinator of FREEDOM, Inc.

The Nipa Palm sugar was awarded as the "Best New Product" during the 11th Agriculture and Fisheries Technology Forum and Product Exhibition held in August 2015. held in SM Megamall. "The award served as fuel to SIWA members to cooperate more for the project," Mr. Peralta shared.

According to Mr. Fontanil, the next steps of the project include the conduct of capacity building to other areas; benchmarking of Nipa Palm sugar; getting certifications (FDA, GMP, and Halal); and upscaling activities to cater larger market including Japan and Korea. ###

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# RAISING ORGANIC native cattle

BY DIANA ROSE A. DE LEON

Livestock is one of the most important subsectors of agriculture. It is one of the smallscale types of backyard enterprises wherein rural households raise livestock either as additional farm worker or as supplementary source of income.

The livestock industry, specifically cattle, remains one of the least progressive commodities in the country as manifested by its low local cattle population and continuous importation of both live cattle and beef products to meet the local market demand.

The Philippine cattle industry is predominantly enlivened by few private farms and largely by smallholder farms. In 2013 data released by the Philippine Statistics Authority (formerly the Bureau of Agricultural Statistics), about 93 percent or 2.32 million cattle are raised in backyard farms and only seven percent (or 174,547 cattle) is commercially raised.

This shortage provided a window of opportunity for other stakeholders and industry players to go into cattle business. One case is the Tagkawayan, Quezon wherein through the initiative of its local government unit (LGU), was able to intensify the native cattle production in its municipality. This is through the project, "Promotion of Native Cattle Breeding, Production and Management using Organic Approaches" funded by Bureau of Agricultural Research through its National Technology Commercialization Program.

According to the Office of the Municipal Agriculturist of Tagkawayan, there is a high demand for native cattle meat but the municipality noted a declining population of native cattle, which on its latest survey only has 1, 628 heads as compared to the highly bred stock cattle that has 7, 891 heads. The focus on native cattle is for the reason that it is a low cost cattle breed but has prolific attitude, high disease resistance, and superior meat quality – a breed that can adapt well to the environment and ensure an income for the farmers. Also, Tagkawayan has a vast pasture area reaching to 15, 000 hectares, and can supply the natural feed resources needed.

The project is hoped to revive and boost the native cattle industry of the municipality.

**Organic production of native cattle**

There were 120 Tagkawayan farmer recipients who received one native cattle each coming from the project. This was the starting stock that the proponents tried to propagate and hopefully disseminate to other interested farmers.

A Memorandum of Agreement (MoA) between the farmer recipient and the municipality of Tagkawayan was created to ensure that both parties understood their responsibilities. The agreement stated that the farmer recipient will receive a dam (*inahing baka*) and will only gain ownership if the dam will be able to produce offspring, which will be returned to the LGU that will have the responsibility to disperse the offspring to the next farmer recipients. Full ownership of the dam by the farmer recipient will only be ensured if it will be able to produce another four offsprings after giving the first-born to the LGU.

The farmer recipients are enjoined to follow the recommended organic practices and technologies. Seminars were given on organic cattle production and management, native cattle production which included the sharing of farmer cooperators' experiences, and ruminants' disease prevention and control. Study tour was also organized for farmer recipients on native cattle fattening and production in Tiaong and Sariaya, Quezon.

**Interventions**

Some of the practices taught to the farmer recipients were the use of natural means of treating ailments of native cattle such as the use of palm fruit, *ipil-ipil*, *alagao* fruit, and *tubang aso* in making concoction for deworming; the use of guava leaves for wound treatment; the use of *alagao* leaves, *kakawate* leaves and bark, *kamaria* leaves, and *makabuhay* for external parasites and; the use of boiled star apple leaves and bark, guava leaves, Cogon grass, corn cobs, and *duhat* leaves for diarrhea treatment.

For the feeds, the farmer recipients were taught on using organic forage including Napier, Para grass, Carabao grass, Centrosema, Cogon, Guinea grass, Trichantera, rice straw, corn cobs, rice bran, and coconut.

Aside from the package of technologies transferred to the farmer recipients, they were also organized into an organization called the Native Cattle Raisers Association of Tagkawayan. Though the project helped on forging a partnership with the Municipal Livestock Dealer and Raiser, the association serves as vehicle of the farmer recipients to market their produce and help the recipients to access other technologies on native cattle production and management.

Based on the cost and return analysis done by the LGU-Tagkawayan, it is estimated that the farmer recipient will have a net income of Php 137,50.00 in four years given that the dam remains healthy and is able to produce an offspring per year. ###

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References:

1. Beef Cattle. Retrieved on Nov. 2, 2015 from www.pcaarrd.dost.gov.ph/home/momentum/ruminants/index.php?option=com_content&task+view&id=173&Itermid=216
2. Tacio, Henrylito D. (2013). Promising outlook of cattle industry. Retrieved on Nov. 2, 2015 from archive.sunstar.com.ph/davao/business/2013/10/13/promising-outlook-cattle-industry-308468

photo courtesy: Dr. GV Pangga/UPLB

# Exploring organic fertilizers in pellet form

BY VICTORIANO B. GUIAM

The use of swine and poultry manures for organic fertilizer or soil conditioner purposes is attractive. Manure is a good source of plant nutrients. Its useful properties can vary and are determined by the type of animal which produces it, the husbandry or method of growing used, the rations fed to the animals, and even the volume of animal beddings that may be included in the raw form. There are, however, risks involved. Pathogens hazardous to human, animal and plant health can be introduced into the compost when animal manures are used as raw materials. Other concerns are nutrients, salts, and heavy metals that can leach into the groundwater or transported to surface waters by runoff. With the growing demand for organic foods, it is crucial that issues related to agricultural inputs be carefully examined. Government, industry, and consumer groups have to take measures to ensure the protection of the public.

In composting wastes into organic fertilizer, soil organisms decompose and stabilize the organic component. However, after composting, organic fertilizers remain bulky.

What if organic fertilizer is compressed into compact form to save on weight and space? Would it still be as effective as regular organic fertilizers? Would it be a good alternative to chemical fertilizers?

## Densified organic fertilizers – UPLB study

One possible answer to increase the efficiency and effectiveness of organic fertilizers is to apply densification technology in which organic fertilizers are extruded into pellets. With the reduction in volume, costs of transportation, handling and storage can go down. Also, by adding other organic material, the nutrient content may be adjusted.

Finding out the efficacy of developed fertilizers and soil conditioners, such as pelletized organic fertilizer (with and without animal manure), for horticultural crops grown under various soil conditions was part of a bigger study conducted by researchers from the UPLB Farming Systems and Soil Resources Institute, Agricultural Systems Cluster led by Dr. Gina Villegas-Pangga titled, "Management, Utilization and Value-Adding of Animal Waste to Reduce Environmental Liabilities and for the Improvement of Degraded Soils".

Implemented in August 2012 – December 2014, the study sought to develop good animal waste management practices, put to good use the manure from animal production, prevent its potential for environmental damage, help in rehabilitating depleted soils, and, at the same time, maximize the economic and environmental performance of animal farms. Specifically, it aimed to: 1) produce organic fertilizer or compost/soil conditioner from livestock and poultry wastes that are safe for agricultural use; and 2) determine the efficacy of developed fertilizers and soil conditioners for agricultural crops grown under various soil conditions (degraded soils).

Swine and poultry manures were gathered from project sites in Batangas, Quezon, and Laguna and taken to UPLB for composting. Composting was done following a modified Berkley Rapid Composting Method, a much faster method than regular composting which can take a year. Other raw materials (rice bran, rice ash, soya meal, carbonized rice hull, alumino-silicates, and *Gliricidia sepium* or *kakawate*) were used as additives to adjust the nutrient concentration of the compost products to conform with the Philippine National Standards for Organic Fertilizers (PNS-OF) established by the Bureau of Agriculture and Fisheries Product Standards (BAFPS). Samples were subjected to chemical and microbial analyses for comparison with the PNS-OF.

A specially fabricated molding machine was used in making pellets (densified organic fertilizers) out of the material. To test the efficacy of the pelletized organic fertilizers, a series of pot and plot experiments using corn, bush stringbeans, and *pechay* were set up at UPLB. These compared pelletized swine manure-based organic fertilizer, pelletized poultry manure-based organic fertilizer, and pelletized vermicompost with dried raw swine manure, dried raw chicken manure, fresh *kakawate* leaves, and the recommended chemical fertilizer rate along with a control (no fertilizer) under different soil conditions. A field experiment using corn as test crop was also conducted comparing pelletized swine manure-

turn to page 30

# When organic matter matters:
## Enhancing mungbean productivity

BY DARYL LOU A. BATTAD

Caring for the health is probably the primary reason why organic food has been on the rise over the last decade. However the role of organic agriculture is not limited to providing people safer, healthier food, but also, and more important, promoting balance through enriching land resources, thus sustaining a good cycle in the ecosystem.

This is the case of the project implemented by the Cagayan Valley Research Center (CVRC) in Ilagan, Isabela. With a title, "Development of Organic Fertilization Technology for Enhanced Mungbean Productivity in Region 02," the project aims to determine and showcase different fertilization techniques on the production of mungbean specifically to rice and corn farmers in the region. Funded by the Bureau of Agricultural Research under its Organic Agriculture Program, the project, led by Ms. Rose Mary G. Aquino, station manager of CVRC, gives utmost importance not only in the welfare of the farmers, but also for Cagayan Valley's rich natural resources.

Tagged as the Mungbean Capital of the Philippines, Cagayan Valley is now the largest mungbean producer in the country due to its huge and increasing production specifically in San Mateo, Isabela.

According to the data of the Philippine Statistics Authority (formerly the Bureau of Agricultural Statistics), in 2012, the region's production area ranged between 10,000-16,000 hectares of mungbean from 2008-2012, which was significantly larger than other mungbean producing areas in Ilocos Region, Central Luzon, Western Visayas, and ARMM. On average, the Cagayan Valley region produces 502 kgs/ha of mungbean.

**What is mungbean?**

Mungbean (*Vigna radiata* L), locally known as *monggo* or *balatong*, is an important short duration and drought tolerant crop in the Philippines. It is widely used as human food as dry beans or sprouts, but can also be used as green manure and as forage for livestock.

One important feature of this crop is its ability to adapt in many cropping systems and rotations which diversifies the cropping systems. Also, mungbean has a remarkable quality of fixing atmospheric nitrogen that enriches the soil. Moreover, this mighty pulse species is considered best to rotate with cereals, and can grow well under varied conditions.

Apart from its agronomic qualities, mungbean is a storehouse of various nutrients as its seeds provide significant amounts of protein, fiber, and ash. Its digestibility and non-flatulent properties serve as an edge over other legumes. In addition, mungbean is lower in phytic acid, which is commonly high in cereal and other legume crops, thus a good protein supplement in cereal-based diets.

**Organic mungbean production in Region 2**

Following the "Third *Balatong* Festival" is the declaration of San Mateo, Isabela as the Philippines' Munggo Capital. It was also during that time when Agriculture Secretary Proceso J. Alcala reiterated the use of organic fertilizers to enhance productivity of mungbean. He emphasized that mungbean has to be grown safely as it is the cheapest protein substitute and is the most accessible food to the masses, thus this project.

In Region 2 and other legume-growing areas in the northern and Central Luzon, crop rotation (rice-mungbean and corn-mungbean or corn-peanut) is generally practiced because such cropping system forms mutual and beneficial allelophatic relationships. There are known advantages in practicing crop rotations versus monoculture such as increase in yield, better control of weeds, pests and diseases, maintenance of organic matter content in the soil, balanced utilization of soil nutrients, better distribution of farm labor and less economic risks. Mungbean proved to contribute to preserving and realizing the optimum potentials of crops and soil alike.

The project was carried out through on-station trials on organic fertilization technology, on-farm technology verification trials, and development and distribution of information, education, and communication (IEC) materials of the developed package of technology (POT).

The project team identified three registered mungbean varieties tested to different organic solid fertilizer such as *Rhizobium* inoculant, vermicast, along with organic fertilizer products from CORDEV, Greenfield (Payoga), and Station produce. In this stage of the experiment, it was found out that two of the mungbean varieties, *NSIC Mg 12* and P*agasa 7,* showed positive response giving mean bean yields of 1,012.15 kgs/ha and 955.65 kgs/ha, respectively. Economically speaking, in these varieties alone, a farmer can practically increase mungbean yield and income through the use of low cost *Rhizobium* bacteria seed inoculants. The same positive results were evident under the experiment of the same varieties using different organic foliar fertilizers.

The top three yield increasing treatment fertilizers from the on-station trials were then further tested as super imposed researcher-managed on-farm trials which were replicated across the identified farmers' mungbean fields, under rice-based and corn-based representative sites. The trials consistently showed improvement in yields of the three tested varieties.

To further validate the effect of the different organic fertilizers, trials were also conducted both under the dry and wet seasons. Consequently, they manifested positive results.

**Promoting organic mungbean**

Owing to such favorable results undertaken by the project, it is now being promoted through the production and distribution of IEC materials. A field day was also conducted to showcase organic fertilization technologies on mungbean production to farmer-producers in rice and corn-based conditions. Such materials demonstrated the application rate and its associated procedures in the various stages of mungbean production.

The ability of the improved organic fertilization technology in enhancing bean and fodder yield, along with the farmers' income can be an inviting strategy for an increased production of mungbean as a rotating crop and intercrop in cereals and other crops. This, in turn, sees to address the sustainable agriculture call for at least, safe food production and soil regeneration. ###

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# Developing **ORGANIC FEEDS** for poultry

BY RITA T. DELA CRUZ

Eating organic foods has become well-liked by everyone nowadays. Not only has it become a trend but a conscious effort towards healthy-living. Given the growing trend for healthier lifestyle and the need for organic foods in the market, the demand for organic products is expected to rise in the coming years.

But how does one know that what he or she is eating is really organic or not?

For poultry, everything boils down to feeds.

The Philippine National Standard (PNS) specifies that organic production focuses on providing living conditions that permit natural behaviors and allowing outdoor access, organic feeds, preventive health management without using antibiotics or other drugs. It is based on self-limitation on the use of various means of production to achieve an animal and environment that are compatible to the production of high-quality products and that respond to consumers' demands.

Specifically for organic poultry, the standards, as stated in Council Regulation No. 1804/99, which was cited in the study of Sundrum (2005), that chickens and ducks should be fed with 100 percent certified organic feeds and that they must have access to vegetation or green fodder. Also, the ration must be organically-produced and feedstuff should be without synthetic fertilizers or pesticides. The diet should be formulated without animal drugs, slaughter by-products, antibiotics, and feeds from genetically-modified organisms.

Given these specifics, consumers believed that the organic foods are safer because they are produced in environment-friendly system method and are more nutritious than conventionally-produced foods.

For poultry, there is a growing demand for organic egg and meat but it is continuously being beset by various challenges. And since organic poultry production all boils down to the production of organic feeds, sourcing adequate supply has been one of its most crucial challenges.

It was from here that a research study titled, "Development of Organic Feeds for Broiler Chicken and Duck Layer in Region 3" is being conducted by the researchers from Pampanga State Agricultural University (PSAU).

According to Dr. Norman de Jesus, project leader, currently, the local supply of organic feeds is not available in the market. Most organic feeds are sourced from other countries adding to the cost of production. This is linked back to the lack of suppliers who can grow and produce organic ingredients that can be used in the formulation of feeds for different stages of growth and production of animals. "Soya and corn, the top leading feed ingredients, are not yet grown-organically hence, they cannot be included in the formulation of organic feeds," explained Dr. de Jesus.

The study aimed to develop organic feed mixture based from organically-produced feed resources and determine their effects on the performance and product quality characteristics of poultry. The strategy, according to Dr. De Jesus, is to map the available feed resources in the community, which will be grown organically. Then, the nutritional value of the selected feed ingredients will be analyzed prior to formulation and processing into poultry feeds.

The study is only on its first year of implementation since it took off in September 2014 and so far, many have been accomplished according to the report of Dr. de Jesus. "We've selected and studied the feed resources, i.e. *adlay*, rice bran, sweet sorghum, snail meat meal, vermi-worm, janitor fish, Trichantera, azolla, malunggay, and duck weed; and subjected them to laboratory analysis for their nutrient content. Also, we formulated and pelleted organic broiler chicken and duck layer feeds," Dr. de Jesus reported.

Currently, the study is being continued with the conduct of feeding trials with chickens and duck. ###

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References:

1. Bureau of Agriculture and Fisheries Product Standards. (2003). Philippine National Standards: Organic Agriculture. PNS/BAFPS 07:2003 ICS 65.020
2. De Jesus, N.G. (2015). Development of Organic Feeds for Broiler Chicken and Duck Layer in Region 3. An unpublished proposal and progress report submitted to the Department of Agriculture-Bureau of Agricultural Research.
3. Sundrum, A. (2005). Possibilities and limitations of protein supply in organic poultry and pig production. Organic Revision. WP 4.1.


# Producing organic vegetables through IPM approach

BY MARA SHYN M. VALDEABELLA

The trend to produce and consume organically-produced foods has slowly gained popularity in the country, especially with the benefits that organic agriculture has, not only to the consumers but also to the environment.

Adopting organic agriculture requires the transition from conventional farming to organic management practices. Pest management is one of the identified organic management practices, along with soil and postharvest.

Instead of the synthetic fertilizers, which commonly used in conventional farming, organic farmers use natural pest control techniques which are safer for plants, consumers, environment, and wildlife. Farmers who are into organic farming have adopted and integrated various methods and strategies that prevent potential pests as opposed to treating pest problems once they have already affected the crops.

Vegetables have always been part of the Filipino subsistence—either as a health food for both young and old or as source of income. With organically-produced food known to have greater nutritive and economic value than conventionally produced foods, producing vegetables organically have gained interests among the health-conscious consumers.

With this, the project "Organic Pest Management Approaches in Producing Organic Vegetables in Region 10" was implemented by the Department of Agriculture-Regional Field Office 10 (DA-RFO 10), in collaboration with the Municipal Local Government Units of Lantapan, Bukidnon; and Maramag, Bukidnon. Funded under the Organic Agriculture R&D Program of the Bureau of Agricultural Research, the project designed and tested an integrated pest management approach against insect pests and diseases on seven different kinds of vegetables, namely: pole sitao, cucumber, cabbage, sweet pepper, eggplant, carrots, and tomato.



***Adopting organic agriculture requires the transition from conventional farming to organic management practices. Pest management is one of the identified organic management practices, along with soil and postharvest.***

**Increasing natural enemies**

According to Gupta (2010), biopesticides or biological pesticides are active substances derived from natural sources or living organisms such as plants and animals that are used in pest management. Harmful only to their target pests or a few target organisms, biopesticides offer an ecologically sound and effective solution to pest problems as they pose less threat to the environment and to human health. The most commonly used biopesticides are biofungicides (*Trichoderma*), bioherbicides (*Phytopthora*) and bioinsecticides (B*acillus thuringiensis*).

The pest management strategies for the seven crops included in the study were designed in targeting the insect pest and diseases that caused economic losses in the organic production. To manage the pest and diseases, formulated plant-based biopesticides, which were made from specific parts of indigenous plants with known pesticidal properties, and animal-based (vermiworm) for the vermi tea were evaluated for its effectivity. The biopesticides were integrated with other pest control such as biological control agents (*Beauveria bassiana* and *Metarhizium sp.*), natural enemies or beneficial insects (*Trichoramma chilonis* and lacewings), use of plastic mulch, biofumigation using sunflower for the control of the soil borne disease like bacterial wilt, diversified cropping with alternate planting of the different types of vegetables, planting of flowering plants along the perimeter (amaranth), use of screen as crop cover for tomato and sweet pepper, and bagging of fruits for cucumber and eggplant. This was combined with good agricultural practices such as raising of healthy seedlings or the use of certified seeds, good land preparation, which was done through thorough land preparation with weeds totally decomposed and soil fully pulverized, and provision of appropriate nutrients to plants to facilitate good crop growth using the vermicast and supplemented with biofoliar fertilizers.

**Pest management approaches for vegetables**

The development of the pest management strategies for the vegetable crops was conducted to come up with a holistic approach in managing pest problem while determining the economics. With pests known to react differently to the biopesticides applied, varied pest management strategies were observed in each vegetable production.

Pod borer, aphids, and powdery mildew are pests known to affect the yield and income of pole sitao in organic production. With 58 percent yield loss attributable to these pests, which corresponds a Pph194,704.13 income loss, it was found that malunggay (*Moringa oleifera*) leaves and young stem biopesticide formulation were the best treatment, for both wet and dry season, to increase pole sitao organic production to 69 percent marketable yield. Other biopesticides with extracts of *kamantigue* (*Impatiens balsamina*) and extracts of *luyang dilaw* (*Curcuma longa*) combine with hot pepper (*Capscium frutesens*) were also promising for the control

> **...members of the community became aware that not only it is possible to grow vegetables without synthetic pesticides and fertilizers — one can also earn more by producing chemical-free and of good quality vegetables.**

of pod borer and powdery mildew. Project also found that trimming of damage pods can further increase the marketable yield to 92 percent. Same formulation was also found to improve the marginal rate of return (MRR) of organic carrot production.

Organic production for cucumber, on the other hand, was influenced mainly by damage of fruitfly and downy mildew. This results in an income loss of Pph 78, 833.95. To avert this, project results showed that applying vermitea in growing organic cucumber would yield the MRR of 222 percent and further increased the MRR to 261 percent trough bagging of fruits with used papers due to reduction of fruit damage.

There are two major pests problems identified in organic eggplant production — eggplant shoot/fruit borer (EFSB) and fruit rot, whose damage result to a yield loss of 56 percent or a monetary loss of Pph 232, 654.14. Based from tests conducted under the project, eggplant sprayed with *kumintang* (*Catharanthus roseus*) formulation gave the highest MRR of 179 percent. Project also found how bagging of fruits can lead to a 91 percent increase of marketable fruits and increasing the MRR to 515 percent due to reduction of fruit damage caused by EFSB.

The major problem in organic cabbage production was the diamond back moth and blight. These pests contributed a yield loss of about 5,000kg/ha and estimated income loss of almost Pph 90,000/ ha.

Of the nine biopesticides, project found plots sprayed with *makahiya* (*Mimosa pudica*), *kamantigue* (*Impatiens balsamina*), l*uyang dilaw* with hot pepper extract reduced damage and give the highest marketable yield and MRR of 569, 559, and 550 percent, respectively.

Project also sought to control fruitfly, fruitworm, and blight, which were found to cause an estimated yield loss of 8,567.02 kg/ha, equivalent to Pph171,340.57, in tomato organic production.

Though all nine biopesticides were found to significantly reduce fruit damage, the study found their effectivity host-specific with extracts of red onion, ginger and garlic biopesticide for fruitfly, *langkawas* for fruitworm, and *kumintang* for blight reduction. Study conducted showed that the use of biopesticides alone for tomato organic production was not profitable but when plants were enclosed with net, the marketable yield increases by almost 36 percent.

Fruitfly is also the main problem in organic production of sweet pepper. To control this, project found combination of red onion, ginger and garlic to significantly manage the pest's damage and further reduced damage of fruitfly by enclosing the plants with net. The biofumigation using the wild sunflower (*Tithonia diversifolia*) used at the rate of 2.5 kg/sq m, 15 days before planting was found effective in controlling *Ralstonia solanacearum*, a dreaded disease for solanaceous crop.

**Outcome**

With the positive results, along with the active involvement of the farmers, members of the community became aware that not only it is possible to grow vegetables without synthetic pesticides and fertilizers — one can also earn more by producing chemical-free and of good quality vegetables.

With the increase in marketable yield, lowered production costs and higher profits gained, the project hopes to sustain the increase in production, consumption, and utilization of organically-grown, chemical free vegetables and thus eliminate or at least reduce the use of chemical, synthetic pesticides in the vegetable production. Despite the demands of going organic in vegetable production — labor and effort, project participants still see their harvest more promising not only for their wallets but also for their health.

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Reference:
Gupta S. and A. K. Dikshit (2010). "Biopesticides: An ecofriendly approach for pest control." Journal of Biopesticides 3 (1 Special Issue): 186 - 188 (2010). Retrieved on Oct 10, 2015 from: http://www.jbiopest.com/users/lw8/efiles/suman_gupta_v31.pdf

# Establishing organic **seed production** of high value crops

BY PATRICK RAYMUND A. LESACA

The International Federation of Organic Agriculture Movements (IFOAM) refers to organic agriculture as "reducing external inputs by refraining from the use of chemo-synthetic fertilizers, pesticides and pharmaceuticals. Instead, it allows the powerful laws of nature to increase both agricultural yields and disease resistance".

Organic farming plays a crucial role in helping farmers and producers meet the consumers' demand for organic food products. Evidences showed that there are significant biodiversity, pollution control, energy efficiency, and soil protection benefits associated with organic farming. The indiscriminate use of chemicals has adversely affected soil fertility, productivity, and quality of produce. The degenerative effects of intensive farming practices on soil fertility and ecological balance have forced some organic agriculture advocates for an that entails the need to develop organic seed and plant materials.

**From conventional to organic farming**

The Bureau of Agricultural Research, in partnership with the Bureau of Plant Industry-Davao National Crop Research Development Center (BPI-DNCRDC), collaborated to establish a national organic seed production area in Bago Oshiro, Davao City.

The project titled, "Development of an Organic Seed Production System for Tropical Fruits and Plantation Crops (durian, banana, pummelo, cacao) Phase I", is a two-year initiative led by Bureau of Plant Industry-Davao National Crop Research and Development Center (BPI-DNCRDC) center chief, Dr. Lorna Herradura. The undertaking, which is funded by the Bureau of Agricultural Research through its Organic Agriculture Program, is also in alliance with the Tribal Mission Incorporated, Tugbok District, Davao City; Benjamin Lao Organic Farms, Bansalan, Davao del Sur; and Tubaga Organic Farms, Tupi, South Cotabato.

Aside from the establishment of an accredited center for selected organic tropical fruits and vegetables, the project also aimed to: 1) generate and verify organic seed and plant material production technologies; 2) conduct participatory organic seed production with organic farmer or organization collaborators; 3) strengthen partnership with identified seed collaborators by providing initial support; and 4) develop information materials; and e) conduct field days.

The organic production areas for durian, banana, pummelo, cacao, and other selected vegetables and rootcrops (*okra*, *ampalaya*, bush sitao, sweet potato, and corn) were established in a 4.8-hectare property at the Center, of which, approximately 3.66 hectares were devoted and used for the project.

The target area underwent an 18-month conversion period through proper management and cultural practices associated with organic agriculture production and technologies. The soils were subjected to sampling and were analyzed for rehabilitation to determine the exact nutrients needed. The soil

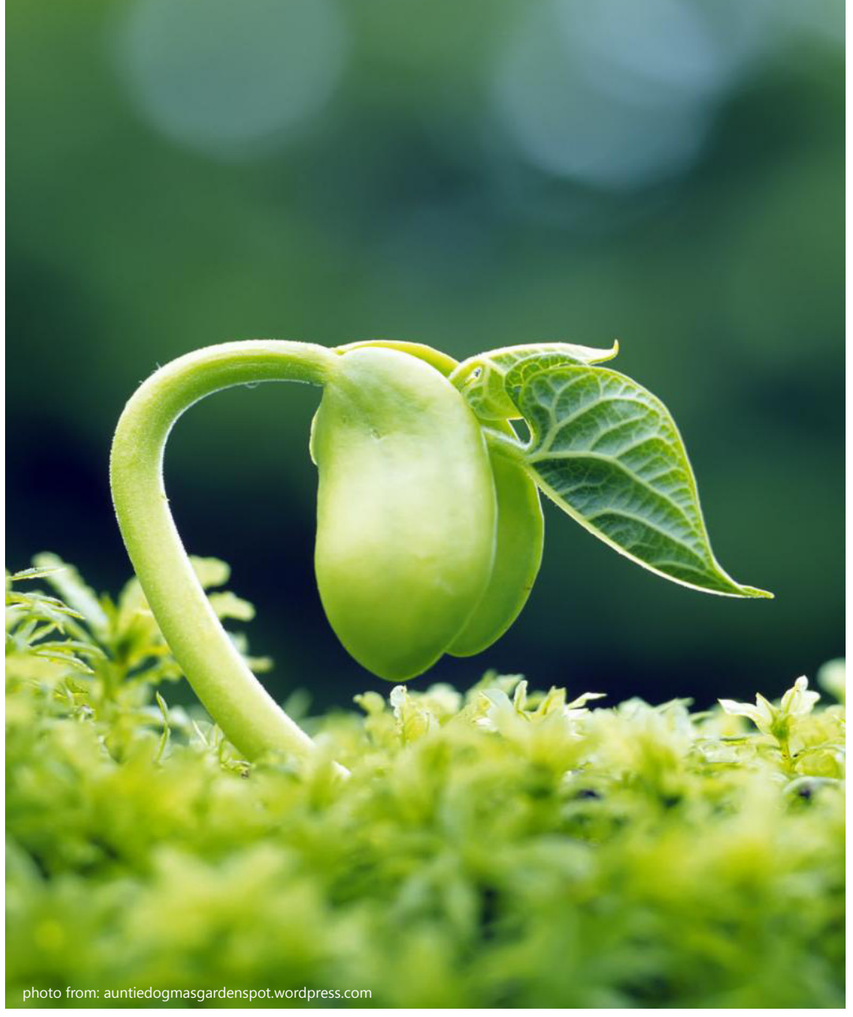

photo from: auntiedogmasgardenspot.wordpress.com

reconditioning was applied by using vermicasts or composts using earthworms and land preparations to eliminate the use of herbicides. The layout or the planning of fruit trees were likewise carried out and for statistical analysis, experiments were conducted using the Randomized Concrete Block Design (RCDB), which were replicated three times. Furthermore, the application of vermicast and mulching was employed for the crops. The intercropping of legumes and sweet potato for banana and cacao, crop rotation of vegetables for durian, and cultivation and hilling-up for bananas were also done. The area was provided with buffer zones, drainage and far from processing plants.

**Project results**

A hectare is now planted with organic durian (Puyat variety) with 132 trees, of which 13 trees are now bearing fruits. There were 1,200 hills of the 1,500 organic bananas (*Lakatan*) that are now established in a hectare farm area. Fourty-nine organic pummelo trees or a fifth of the total 246 trees are now fruit bearing. The NSIC approved cacao variety yields 120 trees out of the 600 trees now planted.

Since the conversion period took place, the project proponents reported preliminary results, indicating that the cultivation and hilling-up for banana obtained heavier bunch at 16.28 kilograms (kgs) and produced more suckers. Banana pseudostem cutting at two meters from the ground obtained the highest bunch weight of 14.50kgs. A total of 1,900 asexually propagated durian and 2,100 sexually propagated (rootstock) cacao were produced. These plants are now being maintained in the center.

The production of durian was further enhanced by the findings that it can be intercropped with leguminous vegetables and other crops. Farmers can derive income from selling vegetables during the juvenile stage and fruiting stages of durian. The Center has also provided 300 and 100 asexually propagated durian and cacao, respectively, and 1,000 tissue cultured *Lakatan* banana plantlets for the establishment of the organic fruit tree areas to the organic farmers in Imam, Bansalan, Davao del Sur.

Organic planting materials on durian, cacao, and pummelo were given free or sold to various clienteles and beneficiaries inside and outside of Region 11 (walk-in clients, farmers, institutions, cooperatives, and associations) at the price of Php 60.00 per seedling for durian, Php 25 for cacao and Php 50 for pummelo; and for organic vegetables seeds - Php 3000/kilo for ampalaya, Php 420/kilo for pole sitao, Php 300/per kilo for bush sitao, Php 350/kilo for okra and Php 26/kilo for corn seeds.

The Center also caters to the needs of accredited nursery operators and other buyers of different planting materials as their mother trees/foundation scion grove, including technical assistance on fruit and plantation crop production.

The Organic Certification Center of the Philippines (OCCP) has issued and granted the BPI-DNCRDC the Organic Agriculture Certificate on December 9, 2014. The certified organic crops planted were corn and vegetable seeds (*ampalaya*, pole sitao, bush sitao and *okra*), tropical fruits (durian and pummelo) and plantation crops (cacao).

Broadening the science-based knowledge on organic seed production technologies, and strengthening the capabilities of the Department of Agriculture and its implementing agencies together with other OA stakeholders, one can surmise that organic farming is plausible and such can be replicated in areas where the determination of farmers, available tools and technologies, government support are within reach. ###

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> **"...organic farming is plausible and such can be replicated in areas where the determination of farmers, available tools and technologies, government support are within reach.**

# Participatory breeding

## for organic vegetable production

BY ANNE CAMILLE B BRION

Lack of farm inputs such as fertilizers and seeds required in organic production becomes a primary concern for organic farmers and growers. Most of the crop varieties that are offered in the market are not suitable for organic production having been developed conventionally using synthetic fertilizers and pesticides which are a big no-no in organic farming. Insufficiency of available organic seeds prompted farmers to use conventional varieties that are not well suited and adapted under organic conditions, usually resulting in lower yields and lesser quality of produce.

"The sustainable way of solving this problem is through participatory breeding and seed production. Such activities capacitate the growers in developing their own varieties and producing their own organic seeds," said Dr. Rodel G. Maghirang, University Researcher from the Institute of Plant Breeding of the College of Agriculture at the University of the Philippines Los Baños (UPLB). "These can be done in tropical vegetables and some semi-temperate vegetables starting from land races, potential organic varieties, and breeding materials which have already been developed by our researchers," Dr. Maghirang added.

To develop organic varieties and produce organically-grown seeds in selected vegetables through participatory breeding, Dr. Maghirang embarked on the project, "Participatory breeding and seed production in organic vegetables," which was supported by the Department of Agriculture-Bureau of Agricultural Research. According to Dr. Maghirang, aside from encouraging farmer seed independence, organic varieties also allow for increasing the genetic diversity in organic farms that can help in withstanding the harsh effects of the changing climate. Employing the participatory approach will likewise pave for elevating breeding and extension researches alongside expanding the pool of practical organic breeders.

Researchers from the Department of Agriculture-Regional Field Offices from Regions 4A, 4B, 8, and 12 were tapped in the implementation of the project and in the identification of possible farmer-cooperators. Training activities were facilitated with topics on breeding, pest and cultural management, production of organic farm inputs, and seed production.

While many farmers showed interest during the course of trainings, only some of them continued to participate in breeding, selection, and seed production due to the tedious process involved especially in breeding activities. Thus, the project focused on farmer-cooperators with promising selections and who showed willingness and cooperation in sustaining the project.

After completing the trainings, farmer-cooperators who chose to proceed were provided with initial seeds of their preferred crops as starting materials. These include seeds of segregating lines of eggplant, pepper, tomato, ampalaya, cucumber, squash, lettuce, and pole sitao that can be further improved with selection or hybridization if the farmer so pleases.

Through the project, farmer-cooperators were able to select lines of various vegetable crops based mostly on market preferences, as well as other factors including days to flowering and harvesting, plant vigor, reaction to pests and diseases, horticultural characteristics, yield, and over-all acceptability. Lines showing desired characteristics were selected, seed produced, and subjected for further evaluation and purification. Some of them have also made crosses/hybridization in different vegetable crops.

In the duration of the project, the farmer-cooperators actively participated and were involved in all aspects of producing organic vegetables – from continuous evaluation and selection of materials, breeding for desirable traits, up to seed production. They were able to market their produce from their selections. More than the experience, they have also learned the importance of keeping records of their selections, sales, and seeds that they produced and distributed. Some of them also continued the breeding activities that they have learned from the project and continues to apply them in their respective farms.

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References:

Maghirang, R.G., et. al. (2014). Participatory Breeding on Organic Vegetables. In: Rahmann, G. and Aksoy, U. (Eds.) Building Organic Bridges, Johann Heinrich von Thünen-Institut, Braunschweig, Germany, 3, Thuenen Report, no. 20, pp. 909-912.

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based organic fertilizer and pelletized poultry manure-based organic fertilizer at two fertilizer amounts with vermicompost and the recommended fertilizer rate.

## Pelleted manure-based organic fertilizer found to be effective

The pelleted organic fertilizers conformed with the PNS-OF. Based on the results, the researchers arrived at the conclusion that the fertilizer efficiency of pelletized organic fertilizers (swine manure-based and poultry-manure-based) do not differ essentially from the non-pelletized organic fertilizers. This means that the pellets can be applied to horticultural crops following the same standard application rates currently used with organic fertilizers. The pelletized animal manure-based organic fertilizers will be able to support sustainable crop productivity, crop health or soil health and can serve as alternatives to commercial fertilizers when these are not available to farmers.

The attractive potential of densified/pelletized organic fertilizers, such as composted organic manure, is that their benefits are available over longer periods of time and, thus, it can be assumed that their use can improve soil chemical and physical properties even after subsequent croppings. According to the UPLB researchers, pelletized organic fertilizers are even more persistent in upland soils as its breakdown is slower than that of ordinary compost. In pellet form, the supply of nutrients could be extended for a longer period of time. With the slow release of the N fertilizer component, pelletizing can improve the efficiency of N fertilization and reduce the problem of N losses through leaching. This favors horticultural crops that need longer supply of nutrients

The advantages of composted manure as pelleted organic fertilizer have also been cited elsewhere. Hara (2001), working in Japan reported that, composted livestock manure in this form is an effective solution to problems encountered with ordinary composted manure which are high moisture content and a high volume per unit of weight that makes its transport difficult and costly. The moisture content can be controlled during the process of pelleting and the volume can be reduced to only 60-90 percent of the raw compost. With the problem of the quality of the compost and its nutrient content not being constant, material can be added during densification to improve the composted manure. Finally, when the pellets are scattered, they generate less of the dust coming from ordinary compost, thus, making its distribution more precise and efficient.

**In pellet form, the supply of nutrients could be extended for a longer period of time. With the slow release of the N fertilizer component, pelletizing can improve the efficiency of N fertilization and reduce the problem of N losses through leaching.**

In the local setting, densification or rendering composted organic material into pelletized organic fertilizer holds promise for organic horticulture production systems. In addition, the efficient utilization of the by-products of animal production as organic fertilizer, compost/ soil conditioners will enhance the environmental performance of animal farms and reduce their environmental liability. However, since the study was done in one cropping only, the researchers recommend that subsequent cropping be done to be more certain about the benefits of densified organic fertilizers, including manure-based organic fertilizers, particularly on their efficiency as sources of nutrients and as soil conditioners for crop production. ###

References:
1. Hara, M. (2001). Fertilizer Pellets Made from Composted Livestock Manure. Food & Fertilizer Technology Center. Retrieved from http://www.fftc.agnet.org/library.php?func=view&id=20110801154610
2. Villegas-Pangga, G. (2014). Management, utilization and value-adding of animal waste to reduce environmental liabilities and for the improvement of degraded soils. Unpublished research report. University of the Philippines Los Baños. College, Laguna.

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Eating organic foods has become well-liked by everyone nowadays. Not only has it become a trend but a conscious effort towards healthy-living. Given the growing trend for healthier lifestyle and the need for organic foods in the market, the demand for organic products is expected to rise in the coming years. Advocating the Organic Agriculture (OA) is the country's proactive response to food sustainability and healthier living. It promotes alternative farming system that totally eradicates the use of excessive chemical-based fertilizer, which is harmful both for the farmers and the environment. *(Photo by Rita dela Cruz)*

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