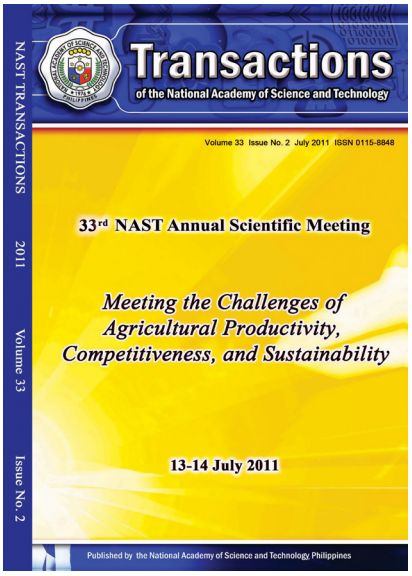
TRANSACTIONSNASTPHL
ISSN 0115-8848 (print)
ISSN 2815-2042 (online)
https://transactions.nast.ph
Vol. 33 Issue No. 2 (2011)
https://doi.org/10.57043/transnastphl.2011.3765

Transactions NAST PHL, is the official journal of the National Academy of Science and Technology Philippines. It has traditionally published papers presented during the Academy's Annual Scientific Meeting since 1979 to promote science-based policy discussions of and recommendations on timely and relevant national issues as part of its functions as a national science academy. Starting in 2021, this journal has been open to contributions from the global scientific community in all fields of science and technology.



How Sustainable is Organic Agriculture in the Philippines?

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Citation
Maghirang RG, De La Cruz RD, and Villareal RL. 2011. How sustainable is organic agriculture in the Philippines?. Transactions NAST PHL 33(2): 289-321. doi. org/10.57043/transnastphl.2011.3765

Trans. Nat. Acad. Sci. & Tech. (Philippines) Vol. 33 (No. 2) *289*
ISSN 0115-8848

HOW SUSTAINABLE IS ORGANIC AGRICULTURE IN THE PHILIPPINES?

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Abstract

Organic agriculture has continued to grow substantially despite the world economic crisis. It is now being viewed as an additional option to conventional or 'chemical' agriculture and not just for the niche market. But uncertainties remain that it can be an alternative option that could feed the world. The reported organic area in the Philippines is just 52,500 hectares but the government support for organic agriculture became more emphatic and accelerated in 2010 with the passing of the "Organic Agriculture Act of 2010" or RA 10068 which provides for its development and promotion in the country. Being an advisory body for science and technology policies and issues, the National Academy of Science and Technology has subsequently conducted discussions addressing the assessment of the status of organic agriculture in the Philippines. Organic pioneers and leaders in their respective fields presented papers related to the issue of 'How Sustainable is Organic Agriculture'. The organic practitioners provided relevant data on the advantages of organic agriculture on income in the case of rice and sugarcane with yields comparable to conventional farming. The need for more research and the help of the scientific community in improving the technologies in organic agriculture were also highlighted specially on livestock and poultry. The paper on health took a different route of dealing on food safety concerns rather than directly on organic produce. But organic agriculture in its present state is still far from its full potential. Given the meager formal support throughout its supply chain including input supply, production and Research and Development on seeds, nutrient and pest management. Thus direct comparison of organic agriculture with conventional agriculture does not appear to be valid. Overall it is well accepted that organic agriculture is sustainable on the ecological aspect but sustainability on the financial and the social/cultural aspects

are still being questioned. There is optimistic prognosis for organic agriculture, but the numerous challenges of agronomic, economic and cultural nature must be addressed more substantially. This would require long term support from research institutions, a strong extension system and a committed public in sharing with the costs of organic agriculture given its multi-functionality benefiting everyone.

Introduction

Global production and sale of organically grown food and fiber continue to increase exponentially. The 2009 tally from 160 countries reporting organic production data finds 37.2 million hectares under organic management involving 1.8 million farmers (Willer and Kilcher 2011). Global sales of food and drinks have expanded, with the 2009 market estimated at 54.9 billion US dollars and a vast majority of products consumed in North America and Europe. Regions with the largest areas of organic agriculture are Oceania, followed by Europe and Latin America. Asia's total organic agricultural area is nearly 3.6 m ha.

The Philippines' organic production area reported in 2009 is 52,546 ha, employing around 70,000 producers/farmers scattered all over the country. The organic industry has been primarily in the hands of the private sector, non-governmental organizations (NGOs), and people organizations or cooperatives. Among the organic crops grown for domestic use are rice, maize, vegetables, fruits and root crops. These are generally produced by small-scale farmers under more diversified farming systems and are integrated with a few heads of livestock (pigs, goats, carabaos, cows, chickens or ducks). Organic farming inputs such as fertilizers, foliar sprays and microbial soil preparations are sourced and made from local indigenous materials. Organic products are sold in special outlets in Metro Manila and major urban centers such as Rustans', Shoe Mart, Landmark, Shopwise, etc. On the other hand, the organic crops produced for export are bananas (Bungulan and Cavendish), banana chips, fresh pineapple, muscovado sugar, coconut palm sugar, virgin coconut oil, coconut vinegar, coffee, asparagus, yellow corn for feeds, Banaba leaves and miscellaneous herbs. These are largely produced through grower arrangements among community-based organizations, agricultural cooperatives and development NGOs or private corporations. Producers usually employ single crop cultivation in the case of sugarcane, asparagus and pineapple but more diversified in the other crops. Inputs are usually produced by the cooperative or company including initial

research on efficacy and production efficiency.

Organic agriculture is one of the livelihood options being offered to farmers in the Philippine Agriculture 2020. Hence it is imperative to take a closer look at it. There have been issues in the past for and against it and we want to clarify these issues to shed light on the controversy. In particular, we want to expound on how organic agriculture is practiced and to evaluate the science behind the practice. With that, the role and place of organic agriculture in the total scheme of agriculture in the country can be pinpointed. The objective of this paper is to highlight some organic agriculture experience of various local and successful practitioners and to address some challenging issues confronting its sustainability.

Variations of Farming

For countless generations, farmers have inherited and managed different farming systems adapted to their local conditions. A common desire to all of them is to produce what they have a demand for. Most of the existing variations on agricultural production system are illustrated in **Figure 1**. In global areas of cultivation, the two most prevailing agricultural systems are conventional farming and sustainable agriculture. In reality though, many farmers practice combinations of the different production systems to augment production and income under local conditions. Conventional farming, variously called "modern agriculture," or "industrial farming", has delivered tremendous gains in productivity and efficiency. Conventional farming systems vary from farm to farm and from country to country. However, they share many characteristics such as rapid technological innovation, alteration of the natural environment, large capital investments for production and management, large-scale farms, mono-cropping over many seasons, uniform high-yield hybrid crops, extensive use of chemical pesticides, fertilizers, and external energy inputs, high labor efficiency and dependency on agribusiness. Traditional agriculture systems on the other hand, has emerged over centuries of cultural and biological evolution and represent accumulated experiences of indigenous farmers interacting with the environment without access to external inputs, capital, or modern scientific knowledge. Traditional farmers have often developed farming systems with sustained yields using intensive experiential knowledge and natural resources, including the management of agro-biodiversity in the form of diversified agricultural systems.

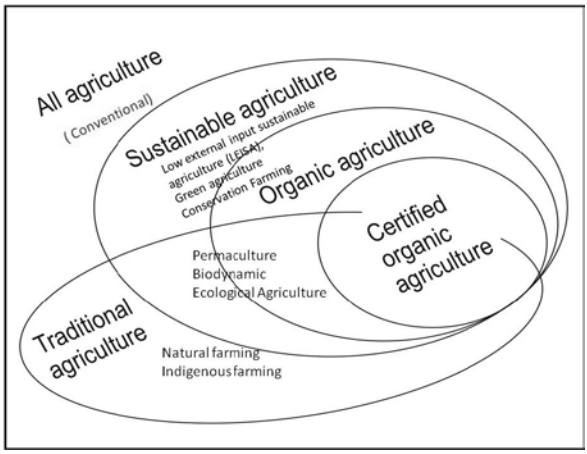

Figure 1. Variations of Farming

As of today, sustainable agriculture appears to be the most popular, government-supported farming programs. It is an integrated system of plant and animal production practices having a site-specific application that will, over the long term satisfy human food and fiber needs, enhance environmental quality and the natural resource based upon which the agricultural economy depends, make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls, sustain the economic viability of farm operations, and enhance the quality of life for farmers and society as a whole. Common practices under this system include crop rotations, integrated pest management, more soil and water conservation practices and strategic use of animal and green manures and use of natural or synthetic inputs that are not harmful to natural systems, farmers, their neighbors, or consumers. Sustainable agriculture encompasses many different production methods, systems, and approaches such as organic farming, green agriculture, conservation farming, natural farming, ecological farming, etc. that aim to meet the goals of profitability, stewardship, and quality of life.

The philosophy of organic food production systems maintains certain principles such as biodiversity, ecological balance, sustainability, natural plant fertilization, natural pest management, and soil integrity. Organic farming excludes or strictly limits the use of manufactured fertilizers, pesticides, herbicides, insecticides and fungicides, plant growth regulators

such as hormones, livestock antibiotics, food additives, and genetically modified organisms. Since farms vary in product and practice, there is also a wide variety in how these principles are applied. Organic farming has its roots in traditional practices that evolved in villages and farming communities over the past many years. Organic agriculture is generally considered to be under the "umbrella" of sustainable agriculture. But it is not exactly a subset, since organic practices may conflict with sustainability goals in certain situations. Organic products can also be unsustainably produced on large industrial farms, and farms that are not certified organic can produce food using methods that will sustain the farm's productivity for generations. Sustainable farms do not follow organic standards; they incorporate ways that will not deplete or permanently damage resources. When the production system is managed in accordance with the standards set by the International Federation of Organic Agriculture Movements (IFOAM) or Philippine National Standards of Organic Agriculture (PNSOA) and to meet the set requirements for national organic certification process involving a substantial fee and extensive record keeping, this type of farming came to be known as certified organic.

Lastly, to ensure food security and to combat crop failures in the country, people should be encouraged to cultivate and use crops that are appropriate for the climatic conditions prevailing in their areas, especially the traditional ones. Farmers should be given the choice on how to farm, make appropriate choices for their land, their animals, and their local situation in general. Education and improving the way food is produced can make a big difference.

Highlights of RTD on Organic Agriculture

The National Academy of Science and Technology (NAST) Philippines, the country's lead advisory body on science and technology issues and policies, conducted a round table discussion on March 14, 2011 where the following objectives were addressed: i. Assess the status of organic agriculture of the country; ii. Identify issues related to productivity, sustainability and competitiveness, and iii. Recommend actions on policy related to organic agriculture. Speakers were Dr. Charito O. Medina, National Coordinator of Magsasaka at Siyentista Tungo sa Pag-unlad ng Agrikultura (MASIPAG); Edgardo S. Uychiat, President of the Negros Island Sustainable Agriculture and Rural Development Foundation, Inc. (NISARD);

Dr. Angel L. Lambio, Professor of the College of Agriculture, University of the Philippines Los Baños (UPLB); Andry K. Lim, Founder/Consultant of Tribal Mission Foundation International, Inc.; Dr. Oscar Gutierrez Jr. of the Food and Drugs Administration (FDA); Lara G. Vivas of Bureau of Agriculture and Fisheries Product Standards (BAFPS); and Antonio de Castro, Vice-President of the Organic Producers and Traders Association (OPTA). Participants included traders and producers, academe, local government units (LGUs), nongovernment organizations (NGOs) and other people who have a stake of the organic agriculture industry. The main provocative question raised is how sustainable is organic agriculture? Making a comparison between sustainable agriculture and the legally protected organic agriculture was the focal issue.

Sustainable Agriculture vs. Organic Agriculture

Sustainable agriculture is ecologically sound, economically viable, socially just and humane. Organic agriculture on the other hand is an agricultural production system that promotes environmentally, socially and economically sound production of food and fibers and excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, livestock feed additives and genetically modified organisms. These definitions show that both share the broad goals of ecological soundness, economic viability, social justice and humaneness but they are not identical. The divergence begins with the banning of certain practices in organic agriculture whose justifications are being disputed, rightly or wrongly, as not entirely supported by science. The non-use of the banned inputs can lead to lower initial yields usually during the transition period *(and even thereafter)*. Thus it appears that to become economically viable and competitive, there must be a premium for organically produced food that results in higher food prices to consumers and thereby more food insecurity to the poor. However it has been shown repeatedly that if done properly organic products can be produced cheaper and with a better overall quality than conventional foods. To protect organic producers from spurious labeling and unfair competition, and to assure consumers of the integrity of their food, a need for systems of organic certification had to be in place thus adding to the cost. Hence while organic farming passes the test of ecological soundness, there are still serious reservations, mostly from policy makers, on its economic viability without the premiums, and its ability to meet the equity goal of sustainability. Other most commonly disputed differences between organic agriculture and

sustainable agriculture are on issues of certification, farm size and producers and use of fossil fuels. Organic farms must be independently certified every year and approved by certifying agency while a farm using sustainable practices is more of a way of life and does not require any official certificate. On organic farming, food can be produced by large corporations and there is no limitation on how many hectares can be used to grow the crops. With sustainable farming, food production is carried out by small farmers and their families who live on the land where they farm. They plant crops in relatively small, mixed plots as a form of pest control and to enhance soil and conserve land resources. Supply chain of organically produced can travel thousands of kilometers before reaching your food plate and certification does not take into consideration the use of petroleum to truck food. Sustainable food, however, is distributed and sold close to the farm as possible.

Organic Crops

In the Philippines, development-oriented organizations have long been championing organic agriculture for rural development. For instance, MASIPAG has initiated a range of activities as alternative to the Green Revolution, such as rice and corn programs, diversified integrated systems, and farmer-developed and adapted technologies. Results of their project assessment in 2007 was presented and summarized by Medina (2011) in **Tables 1** and **2**.

Table 1. Comparison of mean yield of rice (kg/ha) involving 840 MASIPAG farmers in the Philippines in 2007

	Masipag Organic	**Masipag in Conversion**	**Chemical Farming**
Luzon	3,743ns	3,436ns	3,851ns
Visayas	2,683ns	2,470ns	2,626ns
Mindanao (Maximum)	3,767ns (8,710)	3,864ns (10,400)	4,131ns (8,070)

Source: Medina (2011)

The total number of respondents was 840: 100 farmers in each category except for Visayas where 80 were involved. MASIPAG means that they are planting their own rice varieties and not spraying pesticides but are still

adding some chemical fertilizers. So in this case, the yield comparison was between the three categories of farming: MASIPAG Organic, MASIPAG in Conversion and Chemical Farming.

Maximum average yield of 8,710 kg/ha (M-organic), 10,400 kg/ha (M-conversion) and 8,070 kg/ha (Chemical Farming) were obtained in Mindanao. No significant difference on grain yield among farming categories across Philippine regions was observed.

On the contrary, results showed highly significant difference on average annual net income comparison across the regions (Table 2). MASIPAG's corn program are still in its infancy and not as successful as in rice. Most of their cooperators are rice farmers and have less experience in corn farming and more so, their corn yields are still 20% lower than the commercial hybrid seeds. The important thing is to be able to compete with the hybrids to be adapted by the farmers. At present, there is no successful corn varieties developed for MASIPAG farming.

Table 2. Net agricultural income per hectare among MASIPAG farmers in 2007 (Pesos)

	Masipag Organic	**Masipag in Conversion**	**Chemical Farming**
Luzon	24,412**	18,991**	13,403**
Visayas	22,868**	16,039**	13,728**
Mindanao	23,715ns	17,362ns	19,588ns
Average	23,599***	17,457***	15,643***

Negros Island Sustainable Agriculture and Rural Development Foundation, Inc., better known as NISARD, founded in 2005, is the prime mover of promoting organic agriculture development in Negros Island. Its mission is to make Negros Island the organic food island of Asia by advocating and promoting organic agriculture across the island, evolved out of the serious socio-economic and environmental problems faced by Negrenses. NISARD embarks on organic agriculture as a strategy towards poverty alleviation and food security. Setting these objectives off the ground, NISARD forges alliances with various organic agriculture advocates and

practitioners and tapping public, private partnership wherein the provincial government provides funding and policy support for organic agriculture programs and projects. Various organic farming strategies are being practiced and promoted (Uychiat 2011). Formation of various commodity clusters, particularly small scale farmers is vital element where each cluster collectively addresses diverse issues and concerns affecting them. This resulted to the creation of various associations such as the Negros Island Organic Fertilizer Producers Association (NIOFRA), Organic Coffee Producers Association, Negros Organic Muscovado Industry Association (NOMIA), Negros Organic Rice Industry Association (NORIA), etc. As organic farmers and practicioners in Negros Island gain knowledge and experiences, various significant breakthroughs have already been achieved that shows significant results. A certified organic producer based in Sagay City, Negros Occidental who runs 194 ha of certified organic sugarcane, obtained an average yield of 60 t/ha canes (**Table 3**).

Table 3. Organic and conventional gross sales comparison under rice and vegetable systems

Farming System	**Crops Grown**	**Gross Sales (annual)**
Diversified Organic Farming System[1]	Rice (0.7 ha) + Vegetables (0.6 ha.)	P332,000.00[3]
Conventional[2]	Rice monocrop (1.3 has.)	P72,000.00

[1]*Based on NICERT list of certified organic farm products (rice, pechay, baguio beans, carrots, ampalaya, bananas, okra, tomatoes, papaya.*
[2]*Mode of farming before shifted to diversified organic farming system in 2007.*
[3]*Sales with premium price for organic products.*

This is almost the same yield level obtained when using the chemical based sugarcane production but, the company saves a lot in terms of expenses in purchasing expensive chemical inputs. The same story hold true with a certified organic rice-vegetable farmer whose income more than doubled from sales of organic vegetables such as carrots, onion leaf, pechay, Baguio beans, potatoes, etc. using diversified organic farming system as compared to conventional farming (**Table 4**).

Table 4. Yield and cost comparison on organic and non-organic sugarcane at Sagay City, Philippines

Comparison	Average Yield/Ha (in ton)	Production Cost/Ha (newly planted)	Lkg/TC
Organic (Kent Javelosa)	60 (2008-2009)	P30,000.00	1.70
Non-Organic[1] (neighboring sugarcane farm)	65 (2008-2009)	P45,000.00	1.65

[1]Based on the prevailing practices in sugarcane production in Sagay City.

NISARD's intervention with the certified small scale organic producers in Mt. Kanlaon increased yield from 0.8 to 1.2 kg/ha from coffee trees in the rainforest. Aside from improving productivity using the modern organic farming technologies, farm income increased and most importantly help protect the remaining flora and fauna in Mt. Kanlaon, the highest peak and home to various endemic species in Negros Island. Along with the growing number of certified producers and practitioners coupled by the growing consumer awareness and increasing income, developing local market for organic products become more imperative.

Organic Livestock

The academe has also been doing its share in developing organic agriculture. UPLB is on the track to fully develop the organic chicken meat and egg production in the country amidst problems like source of stock for breeding, flock health care, management system, and source of organic feeds (Lambio 2011). However, here are still no stocks that are specifically developed for organic production. The two breed-groups of free-range colored chickens namely Sasso and Kabir being considered for organic production are imported hence; supply is not reliable and not sustainable. The present constraint on stocks could be partly addressed if we consider the native chickens as option (Figure 2).

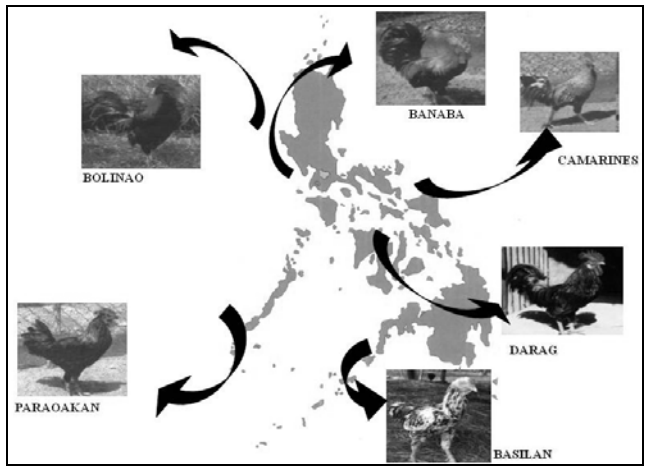

Figure 2. Genetic groups of Philippine native chickens.

Almost 50 % of the total chicken inventory in the country is of the native-type. These chickens however, are raised by smallholders primarily for their own consumption and additional source of income. Their productive and reproductive performances are variable indicating high potential for genetic improvement through the application of appropriate selection methods and mating systems. It is noteworthy that some genetic groups of native chickens have already been identified, though there are still shortfalls in leveling up with the poultry production of developed countries like France. A possible solution to this is the breeding of a native chicken such as Banaba or Paraoakan and a commercial broiler that produces offspring with better performance (**Table 5**).

Table 5. Growth potential of native chickens and their hybrids

GENETIC GROUP	BW 6wks,g	BW 8wks,g	BW 12wks,g
BANABA(BB)	358	549	879
PARAOAKAN (PN)	319	514	880
COMMERCIAL BROILER(CB)	1528	2159	3298
F1 of BB x CB	772	1162	1721
F1 of PN x CB	731	1137	1849

However, breeding should not oppose the natural behavior of animals so that they can adjust easier and reproduce under prevailing environmental and management conditions. Protocols for new breeding strategies are now being undertaken to meet these shortfalls. The local supply of organic feeds is a major constraint. Some organic poultry producers could have easily passed organic certification if only they have consistent supply of organic corn and organic soybean or other legume substitutes. Organic feeds are still being imported by commercial producers of organic chickens. In the traditional way of raising native-type chickens in the Philippines, feeds that are given include rice and rice by-products, corn and corn by-products, legumes, chopped root crops banana and coconut meat. On the range they are also able to find fallen grains, insects, small fishes, succulent leaves and flowers. Many of these feedstuffs are produced with none or just minimal use of harmful chemicals and other synthetic substances. Farmers practicing organic crop production and at the same time raising chickens could feed them with their own organically-produced feedstuffs. The climate in the Philippines is conducive to the growth of harmful microorganism that causes diseases to chickens and other poultry species. As a consequence, high morbidity and mortality rates are incurred making the production of meat and eggs unnecessarily high.

Herbal medicines have shown potential but constant supply is a problem. Management system should be aimed to develop harmonious relationship between land and the animals, and respect for their behavioral needs. Housing and equipment should permit natural behavior including outdoor access; protect the birds from the elements, maintain a comfortable temperature, provide ventilation and clean bedding and allow birds to exercise and conduct natural behavior. Manures produced should be disposed properly. This would be essential not only on the aspect of food safety but also on Nitrogen balance/accounting (MINAS).

The Philippines has a great prospect of developing an organic production system for chicken meat and eggs. We have our very own Philippine native-type chickens as stocks that we could further develop to suit the requirements of organic production systems. We have large tract of fertile lands which could be used for the organic production of feeds needed by the chickens could be locally produced. Medicinal plants can be used in maintaining good

flock health of the birds. Production could be year-round with minimal expense on housing and facilities.

Lim (2011) focused discussion on livestock "sustainability and productivity" in connection to climate change, pollution in production and food security guided by Natural Farming concepts on "respect for life". For instance, housing for livestocks should be according to "original" living conditions of the animals thereby reducing stress during their growing period. For example, in the conventional way, pigs stays on concrete, steel or plastic facilities. Concrete floorings tend to be slippery hence limit the animals from running and enjoying life. While under natural farming, beddings are 1-meter deep mixture of sawdust, soil, salt and indigenous microorganism is used. Coco dusts and rice hulls are other locally available materials that can be used as substitutes in the mixture. This type of beddings could serve for 10 years by just maintaining the depth of the beds. Farmers can also change the beddings after two years and use this as farm fertilizers. More so, on the housing facilities, split type of roofing is utilized for better aeration and ventilation. Sunlight that goes into the pens served as disinfectants eliminating odors and other undesirable microbial activities. There is significant savings on water-use since there is no bathing and cleaning involved just the water consumed by the animals.

Another way of doing natural pig farming is the free-range system. It eliminates the high cost of housing facilities and feeds but bigger land area is required. Hybrid pigs have been identified that fit into the production system. One critical point is to establish a dynamic farm plant population that can sustain the supply of nutritious-safe food for the herd, a semi-closed organic crop-livestock integration.

Standards and Certification

Ms. Lara G. Vivas (2011), Senior Scientist and Specialist in the Bureau of Agriculture and Fisheries Product Standards (BAFPS), discussed and presented standards that are basically technical specifications that are made available to public as private standards or national standards, for use of the producers, farmers, as well as the consumers of the country. These are drawn up with the cooperation and consensus or general approval of all interests affected by it based on the consolidated results of science, technology and experience. Standards are aimed to promote optimum community benefits

and approved by a body recognized by national, regional, and international levels. Minimum requirements for safety are also defined in the standards, the freedom from unacceptable risk of harm and also some standards define the preservation and protection of environment from unacceptable damages from the effects and operations of producers. Standards promote cooperation among concerned agencies and organizations and it facilitates easy implementation. It defines the specific purpose and conditions that prevents or eliminates technical barriers to trade. There is at present no regulation on organic products applicable worldwide, however the 3 main organic standard types can be summarized as follow: a. International Private or inter-governmental frame standards, such IFOAM Standards that seeks to clarify the practices and procedures approved in organic agriculture; those that may be accepted, and those that are to be prohibited or the Codex Alimentarius, b. Baseline Regulatory Standards and Regulation regulates certain organic markets contributing a legal basis for the minimum requirement that a product and its production process have to fulfill in order to label and market it as "Organic". Most organic regulatory standards define the requirements for organic production and labeling within the applicable market but also define certain import requirements, c. Private Organic Label Standards.

The Philippine National Standards Specification for Organic Agriculture was initially prepared by the Organic Certification Center of the Philippines (OCCP) and was adopted by the Department of Agriculture through the Bureau of Agriculture and Fisheries Product Standards (BAFPS). The BAFPS' Technical Committee on Crops and Livestock subjected these organic agriculture standards to a series of Technical Reviews and Public Consultations. These Standards for Organic Agriculture have been prepared for the purpose of providing a uniform approach to the requirements, which is the basis of the following: conversion period, crop production, livestock, processing, special products, labeling and consumer information.

Certification is the procedure by which official certification bodies or recognized official certification bodies provide a written or equivalent assurance that the foods or food control systems conform to requirements. At first, organic certification was privately organized to build trust between producers and consumers; to improve and standardize quality, protect organic producers from fraudulent producer and to "brand" organic certified products. There are 3 types of certification: a. First Party Certification where verification criteria and rules are set and monitored/enforced by the company

itself, b. Second Party Certification, verification criteria and rules are set by buyers or industry organizations, and c. Third Party Certification also called Independent Certification. But the main objective of certification is actually to assess the farm or company and assures in writing that specified standards are met. Certification always has a cost regardless of the type of system (private or public). There are costs for compliance and inspection, registration, etc. These costs should be shared among those stakeholders that benefit from certification, but this is not often the case; producers often bear the bulk of the costs. There are group certification schemes where the group of farmers shares the certificate and certification fee among themselves.

Health Concerns on Organic Food: Food Safety Assurance

The paper on Health Concerns on Organic Food: Food Safety Assurance was prepared by S.H. Lazo and O. Gutierrez, Jr. (2011) of the Food and Drug Regulation but the presentation and open forum was handled by the latter. Food safety assures that food will not cause harm to the consumers when it is prepared and eaten according to its intended use. All the necessary conditions and measures must be followed strictly during production, processing, storage, distribution and preparation of food to ensure that it is safe, sound, wholesome and fit for human consumption. The Philippine food regulatory system instills confidence in the safety of food supply regardless of the method of technology used to produce them. It assures safe levels of contaminants, adulterants, naturally occurring toxins or any other substance that may render food injurious to health. Food safety assurance is ensured across all the stages of food chain from farm to table. The FDA recognizes that there are hazards whether chronic or acute that may make food injurious to the health of the consumers. Assurance of the safety of food products whether organic, conventional or agrobiotech, does not begin or end after the harvest, certification or labeling. There are standards, guidelines, measures and practices that help avoid, control or prevent food contamination hence manage possible health risks. As applicable, all food products should be produced, harvested, handled, packed, transported, distributed, stored, retailed, offered for consumption or sale, and even processed into pre-packed food products under good agricultural practices, sanitary and hygienic conditions, good post-harvest practices, and good storage and distribution, as well as good manufacturing practices and hazard analysis critical control points. Exposure to hazardous contaminants and hazardous level of farm

inputs should be prevented during the entire food chain. There are processes in the government that approve chemicals from pharmaceuticals as farm inputs based on international standards like the Codex. Poor harvesting and handling practices of fruits, vegetables and meat can render food unsafe for consumption.

There are instances when farm animal manures and excretes can contaminate food products. Farm animals are good reservoir of infectious agents. Food whether organic or non-organic still needs adequate washing, proper storage and preparation (cooking) at home and in food establishments. Food safety is "common sense". Organic farms are not absolutely free from contamination and exposure to harmful chemicals. For livestock and poultry products, any chemical inputs whether organic or inorganic should undergo withdrawal or wash-out period before slaughtering. Some plant foods contain toxins such as alkaloids, cyanogenic glucocides, antinutrients, neurotoxins and allergens. Some fruits and vegetables when challenged by increased pressures from insects, weeds and other plant diseases are simulated to produce natural toxins. A hazardous contaminant in food does not only come from chemicals or physical agents. Biological agents and hazards cause adverse effects and infections. This includes pathogens that are highly infectious at low levels ex. *Hepatitis A* virus, *E coli* 0157-H7, *Salmonella sps*, and *E. sakazakii* associated with infant formula. Chemical hazards of biological origin are toxins produced by fungus and algae. Processing of foods whether organic, conventional or bioengineered may also produce some levels of chemicals. These include polyaromatic hydrocarbons in smoked food and acrylamides. Chemical and biochemical hazards are carefully studied by FAO/WHO Codex Alimentarius Commission and its joint expert committees. They recommend maximum residue levels, acceptable daily intake and guidelines on good manufacturing practices to ensure safe levels, food availability and affordability of the products.

There are naturally occurring carcinogens occurring in a cup of certified organic coffee but the level does not pose real risk. Similarly, conventional farm food products may contain more pesticides compared with organically produced products, but the level of pesticides does not pose real risk. Pesticides in conventional food meet regulatory requirements on safety (again there are so many studies on produce exceeding MRL). Some organic farms overseas are allowed to use broad spectrum pesticides derived from

some plants and bacteria which occur naturally. Some even allow antibiotics such as streptomycin derived through fermentation. In some countries, pasteurization which requires heating is not allowed. Plant food products that produce lesions wherein the fungi can grow and produce mycotoxins are common. Nuts for example may contain Aflatoxin from *Aspergillus sps*. Early spoilage of food due to microorganism is known problem. Finally, organic farmers prefer to apply pig and cow manures whenever available because of reduced cost. These "night soils" may harbor *E. coli* 0157. Some organic farmers use sulphur as pesticide but sulphur based preparations may contain lead.

The challenge really is to ensure that food production and processing guidelines, food safety standards and food regulatory measures are followed to assure food safety. Consumers should be protected against false, misleading health claims or labels that would create erroneous impression that processed food products superiority to others just because of the agricultural method or system employed that can not be backed by scientific studies. Research should continue to explore the role of organic foods and its claims in promoting human health safety. Studies are needed to show the health significance and impact of the level of nutrients after processing to public health in the long-term basis.

Organic Agriculture Perspective from the Consumer, Trader and Retailer

Marketing of Organic Product.

Mr. Antonio de Castro is the President of organic Producers Trade Association (OPTA), Project Farm Manager for the ABS-CBN Eco-Village Organic Farm in Iba, Zambales and owner of the Earthworm Sanctuary. OPTA is a network that spearheads the mainstreaming of organic agriculture as a way of life. One of its principal goals is to improve consumer awareness, accessibility and acceptability of organic products and contribute towards increase of sales volume of organic products. He believes that organic agriculture in the Philippines is really a question of food security. His presentation focused on the consumer's/trader's/retailer's perspective of organic agriculture (Castro 2011). Related to cost of products, realistically, organic agriculture should be cheaper compared to conventional agriculture products since there are substantial savings from the use of farmer's locally

produced fertilizer and heritage seeds and non-use of pesticides. But there is a question of supply and demand; there are very few organic farmers now and the product demand is growing steadily fast. Most of the products are contracted to special markets abroad hence get higher prices with premiums. Consequently, very little supply is left for the local markets and prices are up as well. An example is DOLE, Philippines organically produced papaya, banana and pineapple are not seen here because it goes primarily to other Asian countries particularly to Japan with premiums. Now that organics are getting popular, quantity and quality of supply became uncertain: there are more organics in the market compared to what was actually produced and available. Knowing the farmer and his production practices are your insurance to obtain true organic products. Another way is to grow your own product in your backyard or in pots. Obviously no certification is required but still it does not address the major problems. Markets carrying organic products are still difficult to find. If one should go to big established supermarkets in the city such as Rustan's, Shoemart, Landmark, etc. the variety of products sold is very limited. A list of markets and outlets of organic products in the country is mentioned in the later part of this paper.

During the open forum, G. Sarmiento, Executive Director, OPTA, gave some perspective on marketing trends domestically and internationally. On the international front the health and wellness direction is becoming a mega trend and will continue to be so in the next 4 years. Part of that is organic agriculture where brand acquisitions and merging of international brands like Pepsi Co., Heinz, etc. comes in. Even home foods in US are into catering organic products as well as just recently, Uniliver had declared that they are in organic agriculture as well. In the Philippines, the number of organic practitioners has increased since 1990 and is now to the point of certification. The link between the producers and the consumers is actually the certification and that is why the consumers in the Philippines are also looking for organic products. Currently, more people are aware and know more about organic agriculture compared to the 1990s or early 2000. Most of these are small-scale producers whose need has to be addressed. The Philippine consumers' awareness is very high and their concern is really not on the environment but on the health issue. Are these products in compliant to the standards? Remember that in organic agriculture, there is certification and there is a standard.

Castro (2011) further described some organic farming methods employed in their farms at Panay and ABS-CBN Eco-Farm in Iba, Zambales where locally produced organic fertilizers from agricultural wastes are strictly used in production. The method used is Vermicomposting (decomposting using earthworms). Rice hulls are fed to earthworms and later mixed with water hyacinth and other farm wastes. Basically this is also called EM or IMO because of the culturing of the bacteria in the compost then making it as a concentrate of liquid bacteria which is in turn sprayed on the soil and plants. The composts are treated not as fertilizers per se but as microbial inoculant to the soil. This provides good growing conditions for the microbes bringing the soil back to life. Carbonized rice hull or Bio-char is also used as growth medium for the microbes; any charcoal can serve as substitute as well. A mixture of 50% compost and 50% Lahar (sourced from Mt. Pinatubo area) is recommended. The no-till method of land preparation, direct seeding and mulching are common farm practices. The cut grasses and weeds are used as mulch after seeding to keep the conditions wet and moist facilitating germination. The non-tillage of the soil render the bacteria unexposed to sun to be not killed nor disturb its microbial activities. With these practices, the farmer obviously cut costs on labor and use of equipments. The organic crops currently grown are cabbage, sweet-big strawberries, "cilantro", Heirloom tomatoes, etc. He concluded that sustainable organic farming will take over the conventional chemical farming in the Philippines simply because it is better based on its economic feasibility, environmental impact, and production benefits to small farmers and consumers.

Sustainability of Organic Agriculture

When discussing organic farming and other systems of crop production, it is of utmost importance to examine without prejudice these systems of agriculture that can contribute to food sufficiency and security, at present and in the future. Separation of facts and wishful thinking is absolutely necessary and only an unbiased review of scientific literature can provide objective answers to the questions raised. Furthermore, a strong belief and enthusiasm for certain solutions cannot be allowed to hamper the search for objectivity. The basic scientific question remains, and it requires a stringent review and evaluation of the production potential of organic and conventional systems.

On a global perspective, Kirchmann et. al (2008) yield data evaluation from national statistics, organic and conventional long-term experiments and comparative studies compiled from scientific literatures shows that organic

yields are between 25 and 50% lower than conventional yields, depending on whether the organic system has access to animal manure. Yields of organically grown crops in Europe are in most cases significantly lower than those of conventional crops. The amount of manure available on organic farms is usually not sufficient to produce similar crop yields as in conventional systems and therefore green manures are commonly used. However, organic crop yields reported for rotations with green manure require correction for years without crop export from the field, which reduces average yield over the crop rotation. When organic yields are similar to those in conventional production, nutrient input through manure is usually higher than nutrient addition in conventional agriculture, but such high inputs are usually only possible through transfer of large amounts of manure from conventional to organic production. The main factors limiting organic yields are lower nutrient availability, poorer weed control and limited possibilities to improve the nutrient status of infertile soils. It is thus very likely that the rules that actually define organic agriculture, i.e. exclusive use of manures and untreated minerals, greatly limit the potential to increase yields.

Yields of organic agriculture do not exceed conventional yields if the comparisons are made in a systematic and controlled way, as is the case in the field experiments of the temperate areas, or in the studies of Rasul and Thapa (2004) in Bangladesh, and Lyngbaek, et al., (2001) in Costa Rica. The same can be said in studies made by researches but are not organic practitioners in the Philippines. In contrast, when system productivity is estimated at farm level in the course of an agricultural project yield increases of up to 300 percent are reported for the organic system (Kilcher, 2007). The reason for this difference may be that these yield increases were not the outcome of organic agriculture techniques alone; they were at least as much the result of favorable cultural, social and economic dynamics such as the farmers' motivation, the sharing of experience in peer groups and successive learning, or the introduction of new crops which are often the beginning of a whole chain of innovations (Zundel and Kilcher, 2007).

Based on an extensive review of relevant studies Zundel and Klicher (2007) concluded that at national level, organic markets have the potential to improve food security and to improve national food supply. This is also because organic farms produce more efficiently, with more sustainable and stable yields. In some cases, organic farms even enable an increase in production. Organic farms being anchored on multiple cropping system or

crop-livestock integration, harvest a higher diversity of products from the same area, providing more food for the farmers' families and reducing dependency on a few products in the market. Diversity in agricultural production and value added products increases income-generating opportunities and spreads the risks of failure over a wider range of crops and products.(Zundel and Kilcher, 2007).

Pimentel et. al. (2005) examined the data from the 22-year experiments carried out at the Rodale Institute, which compared the organic animal-based (animal manure and legume based system), organic legume-based, and conventional systems. Among the benefits of organic technologies are higher soil organic matter and nitrogen, lower fossil energy inputs, yield similar to those of conventional systems and conservation of soil moisture and water resources (especially advantageous under drought conditions).

Several organic technologies, if adopted in current conventional production systems, would most likely be beneficial. These include (a) employing off-season cover crops; (b) using more extended crop rotations, which act both to conserve soil and water resources and also to reduce insect, disease, and weed problems; (c) increasing the level of soil organic matter, which helps conserve water resources and mitigates drought effects on crops; and (d) employing natural biodiversity to reduce or eliminate the use of nitrogen fertilizers, herbicides, insecticides, and fungicides. Some or all of these technologies have the potential to increase the ecological, energetic, and economic sustainability of all agricultural cropping systems, not only organic systems.

Despite the growing consumer demand for organically produced foods, information based on a systematic review of their nutritional quality is very scarce. Dangour et. al. (2009) quantitatively assess the difference in reported nutrient content between organically and conventionally produced foodstuffs. Based on their systematic review of 55 studies of satisfactory quality, conventionally produced crops had a significantly higher content of nitrogen, and organically produced crops had a significantly higher content of phosphorus and titratable acidity (ripeness at harvest). No evidence of a difference was detected for the remaining 8 (vitamin C, phenolic compounds, magnesium, calcium, potassium, zinc, total soluble solids and copper) of the 11 crop nutrient categories analyzed. Analysis of the more limited database on livestock products found no evidence of a difference in nutrient content

between organically and conventionally produced livestock products. The small differences in nutrient content detected are biologically plausible and mostly relate to differences in production methods. It is unlikely that consumption of these nutrients at the concentrations reported in organic foods in the study provide any health benefit.

In a study of Pacini et. al. in 2003, the authors evaluated the financial and environmental aspects of sustainability of organic, integrated and conventional farming systems (OFS, IFS and CFS, respectively) at farm level and on more detailed spatial scales by applying a holistic, integrated economic-environmental accounting framework to three case study farms in Tuscany, Italy. The impact of the farming systems (FSs) on a number of indicators was studied together with that of pedo-climatic factors at farm, site and field level. The gross margins of steady-state OFSs were found to be higher than the corresponding CFS gross margins. The OFSs perform better than IFSs and CFSs with respect to nitrogen losses, pesticide risk, herbaceous plant biodiversity and most of the other environmental indicators. However, on hilly soils, erosion was found to be higher in OFSs than in CFSs. The pesticide and the nitrogen indicators in this study showed a similar environmental impact caused by integrated and conventional farming practices. Regional pedo-climatic factors were found to have a considerable impact on nutrient losses, soil erosion, pesticide risk and herbaceous plant biodiversity, site-specific factors on nutrient losses and soil erosion. Results at field level suggest that herbaceous plant biodiversity and crop production are not always conflicting variables. The authors also concluded that the fact that OFS in most cases environmentally perform better than IFS and CFS does not mean ipso facto that they are sustainable when compared to the intrinsic carrying capacity and resilience of a given ecosystem.

Badgely, et. al. (2007) evaluated the universality of the claims that organic agriculture can contribute significantly to the global food supply are low yields and insufficient quantities of organically acceptable fertilizers. For the first claim, yields of organic versus conventional or low-intensive food production for a global dataset of 293 examples and estimated the average yield ratio (organic: non-organic) of different food categories for the developed and the developing world were compared. For most food categories, the average yield ratio was slightly <1.0 for studies in the developed world and >1.0 for studies in the developing world. With the average yield ratios, the global food supply that could be grown organically

on the current agricultural land base was modeled. Model estimates indicate that organic methods could produce enough food on a global per capita basis to sustain the current human population, and potentially an even larger population, without increasing the agricultural land base. Data from temperate and tropical agro-ecosystems also suggest that leguminous cover crops could fix enough nitrogen to replace the amount of synthetic fertilizer currently in use. The results are not, however, intended as forecasts of instantaneous local or global production after conversion to organic methods. Neither claims that yields by organic methods are routinely higher than yields from green-revolution methods. Rather the results indicate that organic agriculture has the potential to contribute quite substantially to the global food supply, while reducing the detrimental environmental impacts of conventional agriculture. Evaluation and review of this paper have raised important issues about crop rotations under organic versus conventional agriculture and the reliability of grey-literature sources.

In the global scale, recent models (Badgley, et al., 2007; Halberg, et al., 2007) of a hypothetical food supply grown organically indicates that organic agriculture could produce enough food on a global per capita basis for the current world population: 2,640 and 4,380 kcal/person/day, depending on the model used. The lower value is based on the adult 2,650 kcal daily caloric requirement, while the higher value is based on expectations of a 57 percent increase in food availability, especially in developing countries, giving it the potential of supporting even a larger human population. The model was based on substituting synthetic fertilizers currently in use with nitrogen fixation of leguminous cover crops in temperate and tropical agro-ecosystems. These models suggest that organic agriculture has the potential to secure a global food supply, just as conventional agriculture today, but with reduced environmental impacts.

On the other aspects of sustainability, organic agriculture can provide more employment and reduce the social impact of family displacement as in the case of large scale conventional farming. By being labor intensive, organic agriculture creates not only employment but improves returns on labor, including also fair wages and non-exploitive working conditions. In all countries, the replacement of agricultural labor with chemicals and machinery raises concerns about social stability (e.g. breakdown of communities, mass migration, large-scale urbanization), as well as the devastating impact on the natural environment. (Scialabba, 2007)

In a study on profitability made on 50 cases of organic agriculture the following conclusions were made by Nemes (2009). The overwhelming majority of cases showed that organic farms are more economically profitable, despite frequent yield decrease – i.e. organic crop yields were higher in cases of bio-physical stress (drought); higher outcomes were generated by organic agriculture due to premium prices and predominantly lower production costs. The major difference in the profitability of the two systems was very often determined by the different management skills of the farmers thus, accounting for these seem to be fundamental for correct interpretations of results.

The crop yields and economics of organic systems, compared with conventional systems, appear to vary based on the crops, regions, and technologies employed in different studies abroad. However, the environmental benefits attributable to reduced chemical inputs, less soil erosion, water conservation, and improved soil organic matter and biodiversity were consistently greater in the organic systems than in the conventional systems.

Local Markets for Organic Products

What used to be the "niche" markets for organically produced products, these has expanded to weekend and regular markets for organically produced products. The regular markets are normally situated in super markets and special food outlets in Big cities as : OPTA Coop Store (Loyola Heights, Quezon City), Mario's Café by the Ruins (Baguio City), La Top (La Trinidad, Benguet), Bios Dynamics Cooperative Store (Davao City), Healthy Options, French Baker, The Coffe Bean and Tea Leaf Coffee Shop, Landmark Supermarkets, Robinson's Supermarkets, Rustan's, SM Supermarkets, Iloilo Supermarket and nature's Beauty (Cagayan de Oro). Moreso, the weekend markets remains to be an alternate outlet of organics. Some of the popular ones are: OPTA in the Lung Center of the Philippines (Quezon City), Mara's Organic Market in Legaspi Village on Sundays (Makati City), Organic Market in Salcedo Village on Saturdays (Makati City), Magallanes Organic Market on Sundays (Makati City), Organic na Negros (Bacolod City), Tabo-an (Dumaguete City), etc. Also in many instances, organic products can be bought directly at farms of the organic practitioners, Eco-Farms, etc. As the supply and demand for organics get popular in the country, more markets and outlets will be established. The increase of market share of organic products is greatly dependent on the

involvement of general retailers in the organic food market because it lowers cost and thus expands the consumer base.

Research and Development on Organic Agriculture

Policy Framework on Organic Agriculture

The following are national policies and regulations which influence the development of organic agriculture throughout the Philippines:

Philippine Agenda 21 (PA 21) **-** PA 21 is officially known as the National Agenda for Sustainable Development, PA 21 envisions a better quality of life for all, through the development of a just, moral, creative, spiritual, economically vibrant, caring, diverse yet cohesive society characterized by appropriate productivity, participatory and democratic processes, and a living in harmony within the limits of the carrying capacity of nature and the integrity of creation. The country has developed programs and policies localizing the principles and strategies of the PA 21 down to the municipality and barangay (village) levels. This is the local version of the United Nations Conference on Environment and Development (UNCED) Global Agenda 21.

Agriculture and Fisheries Modernization Act (AFMA) **-** AFMA stipulates the government's policy to ensure the development of the agriculture and fisheries sectors in accordance with the principles of poverty alleviation and social security; food security; rational use of resources; global competitiveness; sustainable development; people empowerment; and protection from unfair competition. AFMA called for the formulation of medium and long term plans aimed at the reduced use of agro-chemicals that are harmful to health and the environment. AFMA was approved by the President of the Philippines last December 1997.

Executive Order 481 (EO 481) - EO 481 Executive was approved by President Gloria Macapagal-Arroyo on December 27, 2005. It hopes to promote organic agriculture as a farming scheme especially in rural farming communities; forge effective networking and collaboration with the stakeholders involved in the production, handling, processing and marketing of organic agriculture products; guarantee food and environmental safety by means of an ecological approach to farming; and ensure the integrity of

organic products through the approved organic certification procedures and organic production, handling and processing standards. This legal instrument also goes with the creation of Bio-organic Farming Authority under the Office of the President. Other House Bills have already been filed on various aspects like training programs at the barangay level to educate more farmers, extension service to groups practicing organic farming, establishing training facilities in every barangay, and granting of special loans to farmers. At the municipal and barangay levels, Local Government Units are encouraged to engage in organic farming through various resolutions, master plans, and programs. Under Section 10 of the EO 481, the Department of Agriculture, through the Bureau of Agriculture and Fisheries Product Standards shall formulate the implementing rules and regulations to carry out the provisions of the said Executive Order.

Philippine National Standards for Organic Agriculture (PNSOA) - The Department of Agriculture through the Bureau of Agriculture and Fisheries Product Standards (BAFPS) approved the establishment of the PNSOA. These Standards for organic agriculture have been prepared for the purpose of providing a uniform approach to the requirements, which is the basis of the following: conversion to organic agriculture, crop production, livestock, processing, special products, labeling and consumer information. In 2004, the Philippine National Organic Board was created to support among others, the implementation of the Philippine National Organic Standards and Certification system; and the establishment of a Five-year Organic Industry Development Program for adoption by the respective units of DA in partnership with the private sector.

Department of Agriculture Administrative Order No. 25 Series of 2005 – Guidelines on the certification of Good Agricultural Practices (GAP) for fruits and Vegetable Farming (FV) - This establishes the rules applied by the Department of Agriculture (DA) for granting, maintaining and withdrawing Good Agricultural Practices (GAP) Certificate to individual growers or farms in the fresh fruit and vegetable sector or to their Produce Marketing Organizations (PMOs) that market and or trade the produce. The certification of agricultural farms is aimed to increase the market access of horticultural products both in the local and foreign markets, to empower farmers to respond to the demands of consumers that specific criteria to achieve food safety and quality be met, to facilitate farmer adoption of sustainable agricultural practices, to uplift GAP-FV farmers profile as member of the

nationally recognized list of vegetable farmers who are setting the benchmark for the production of safe and quality fruits and vegetables, and to enable consumers exercise the option of buying quality fruits and vegetable from traceable and certified sources

Organic Agriculture Act of 2010 (Republic Act No. 10068) - An act providing for the development and promotion of organic agriculture in the Philippines and for other purposes was enacted last April 6, 2010. Subsequently, it was declared as the policy of the State to promote, propagate, develop further and implement the practice of organic agriculture in the Philippines that will cumulatively condition and enrich the fertility of the soil, increase farm productivity; reduce pollution and destruction of the environment, prevent the depletion of natural resources, further protect the health of farmers, consumers and the general public, and save the program for the promotion of community-based organic agricultural systems which include, among others, farmers produced purely organic fertilizers such as compost, pesticides and other farm inputs, together with a nationwide educational and promotional campaign for the use and processing, as well as the adoption of organic agricultural system as a viable alternative shall be undertaken.

Government Research-Development-Extension Initiatives

a. DA-BAR-Gap analysis on Organic Agriculture RDE

   As an initial effort to develop the Organic RDE Agenda for Philippine Agriculture, DA-BAR initiated the gap analysis on Organic Agriculture. Relevant RDE reports were collated across the country on crops, livestock and aquaculture. The result of this was compiled and a workshop was done to determine the gap and what more needs to be done to support the Organic Agriculture Program of the country.

b. PCARRD-DOST-National organic Vegetable RDE Program, Organic Arabica Coffee program

   PCARRD initiated a series of workshops to develop a comprehensive RDE program focused on developing technologies that will help the growth of the particular organic industry. After

years of consultation and planning the National Organic Vegetable RDE Program was funded covering six (6) regions and 17 vegetable crops. The program includes subprograms on Supply chain analysis and policy studies, Variety Development abd seed production, Organic fertilizers and Nutrient management and pest management. The program is on its 2nd year of implementation.

A similar program was developed for organic coffee, focusing on Arabica coffee. It also includes variety selection, nutrient management, pest management as well as processing.

c. SUCs – various initiatives on crops and livestocks

Aside from the above initiatives, various SUCs have also embarked on their own organic programs mostly focusing on organic fertilizer production, crop and livestock production. Among the notable programs are at Benguet State University (BSU), Central Luzon State University (CLSU), Don Mariano Marcos State University, Pampanga State College (PAC), Misamis Oriental State College of Arts and Technology (MOSCAT).

Conclusion

Organic agriculture in its present state is still far from its full potential given the meager formal support throughout its supply chain including input supply, production and Research and Development on seeds, nutrient and pest management. There is still a vast range of opportunities for improvement in organic agriculture where the scientific community can contribute but in a slightly modified framework. Organic agriculture is a dynamic system and takes into account the individual contributions as well as the interactions of the different factors in a given production locus. R and D should work as much as possible within that holistic framework and not revert back to the isolation of active ingredients mimicking again the pesticide mindset of conventional agriculture.

Among the areas with abundant potential for organic agriculture research, where NAST and other government agencies can help are organic variety development in crops and improvement of local strains/stocks in livestock and poultry; microbials to aid nutrient and pest management in

crops and livestock; population dynamics in variety, microbial, pathogen and pest management in the various organic production systems; product and process improvement in organic food, fiber, cosmetics, wellness and habitation; market and consumer studies; health, social, environmental and economic impacts in shifting to organic agriculture.

The technical, economic, and environmental sustainability of organic agriculture has been shown in numerous studies and reviews. It is also being argued that organic agriculture is the only way to go because the extractive nature of chemical agriculture cannot be sustained given our finite resource base. But the questions, doubts and criticisms keep on recurring on the same issues. This brings forth the idea that the sustainability of organic agriculture is not just about the above issues but that it runs counter to the present socio-economic realities which also shape and fuel the political realities. To make organic agriculture sustainable in a broader perspective the multi-functionality of organic agriculture, that is aside from food should be recognized and properly accounted for. It is an ideal platform for conservation of agrobiodiversity, mitigating climate change, ecotourism and preservation of social cohesiveness and tradition. The costs from the above benefits should be shared by the larger society and not just by the organic grower and consumers.

But organic agriculture going mainstream to be economically sustainable would defeat the philosophy behind organic agriculture altogether. As asserted by Risku-Norja and Mikkola (2009) there are indications that conventionalized organic agriculture with monocultures controlled by powerful companies does not pay also much attention to farmers, laborers, rural communities or the society as a whole. With the large agrifood corporations and supermarket distribution increasingly dominating the organic food market, consumers and producers gradually again lose their power (Follet 2009) as in conventional agriculture.

Products to be labeled as organic have to meet the requirements set in the Philippine National Standards for Organic Agriculture. The standards can appear to be restrictive but these are also based on logical and scientific fundamentals and are also subject to frequent review and improvement as the wealth of information, knowledge and technologies increase. The choice of subjecting a product for certification is however under the prerogative of the farmer producer. Under the Organic Agriculture Act of 2010 by which the

government will subsidize the expenses for certification following a set of guidelines. This ensures that the farmers would try to meet the standards after being given a two-year period to scale up and meet the requirements for certification.

Export of organic produce remains to be the major thrust of the majority of the developing countries. Local markets have emerged and are also gaining ground. These domestic markets, though still relatively small, have led to consumer calls and government's interest to regulate the sector. Products certified as organic command high prices and henceforth premium organic products go to rich countries like Japan, where consumers are willing and are able to pay higher prices for such products. However, certifications and labels do not guarantee the safety of food products due mainly to the fact that a lot of things could happen during post-production before the product is consumed. The safety of food products does not begin or end with harvesting, certification or labeling.

Overall, the sustainability issue of organic agriculture must be assessed based on three or four elements that comprise it – ecological, financial, and social/cultural. Scientifically, the ecological aspect is the strongest because organic agriculture and its practices are agro-ecologically based. However, more extensive studies should be done to assess the financial sustainability which greatly influences the social and cultural aspects. The current niche of organic agriculture in the Philippines is at the extremes of the production and market spectra - the small and high-end growers in production and the wellness high-end markets. Obviously, the premium in terms of higher prices given to the produce being marketed from these farms is the driving force for their sustainability. But the question if it would be feasible for large conventional farms converting into organic agriculture is still to be tested. Constraints on yield must be assessed to determine the optimum for productivity and profitability. In the end, where can a farmer make money? Where can the industries be more competitive in the global stage? In all of these, the government should also be assertive of its regulatory role in protecting the environment and the health of its people.

In spite of our optimistic prognosis for organic agriculture, we recognize that the transition to and practice of organic agriculture contain numerous challenges —agronomically, economically, politically, and educationally. The practice of organic agriculture on a large scale requires support from

research institutions dedicated to agro-ecological methods of fertility and pest management, a strong extension system, strong political support and a committed public. Finally, production methods are but one component of a sustainable food system. The economic viability of farming methods, land tenure for farmers, accessibility of markets, availability of safe water, trends in food consumption, and alleviation of poverty are essential to the assessment and promotion of a sustainable food system.

Acknowledgements

The RTD "How Sustainable is Organic Agriculture in the Philippines?" hosted by NAST provided the incentive and support for this publication. The authors are grateful to the following speakers for their presentations: Dr. Charito O. Medina, MASIPAG; Edgardo S. Uychiat, NISARD; Dr. Angel L. Lambio, College of Agriculture, UPLB; Mr. Andry K. Lim, Tribal Mission Foundation International, Inc.; Dr. Oscar Gutierrez Jr., FDA; Ms. Lara G. Vivas, BAFPS; and Mr. Antonio de Castro and Ms. G. Sarmiento, OPTA. Participants included traders and producers, academe, local government units (LGUs), nongovernment organizations (NGOs) and other people who have a stake of the organic agriculture industry. This paper also benefitted from the comments and recommendations of anonymous reviewers.

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