



MAKING BOTH CONVENTIONAL AND ORGANIC AGRICULTURE WORK IN THE PHILIPPINES

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One of the key issues confronting Philippine agriculture (and the rest of the world!) is to what extent organic agriculture should be pushed to replace the current mainstream agricultural practices, also collectively referred to, as conventional agriculture. Both conventional agriculture and organic agriculture employ natural, environment-friendly and sustainable practices such as: (1) minimum tillage for weed control, (2) mulching and fertilization with straws and other farm wastes, (3) use of legume cover crops, (4) use of conventionally-bred high yielding varieties, (5) crop rotation and intercropping, (6) deployment of natural traps and biological control agents, and (7) use of beneficial microorganisms for soil enhancement and pest control. The points of divergence between the two alternative farming systems are organic agriculture's complete ban on the: (1) application of chemical fertilizers, (2) use of chemical pesticides, and (3) adoption of genetically modified crops (GMOs) because of their alleged adverse effects.

Long-term field trials dating as early as 1856 have demonstrated that the productivity of farm lands continuously cropped with wheat, maize, soybean and rice can be sustained indefinitely with judicious moderate applications of chemical fertilizers. On the other hand, scientific studies have shown that the non-use of chemical fertilizers and synthetic pesticides generally results in lower yields, less protection, and higher costs for organically grown crops. Moreover, these fears of GMOs are exaggerated and are not supported by science. Major international and national health organizations, academies of science and professional organizations have issued formal statements supporting the safety of GMOs. It is clear that organic farming, as legislated and promoted by advocates, cannot be the mainstream means of food production in our country, as it will lead to higher food costs and food insecurity for the poor.

However, there are at least three niches where formal organic agriculture makes economic sense, namely: (1) at the household level, using freely available kitchen and farm wastes and making better use of unpaid family labor, as well as in school and community gardens, (2) for domestic farm- and eco-tourism as attractions, demonstrating sound ecology, proper human nutrition, and health and wellness i.e. organic foods, herbals, and supplements, and (3) for global export to create greater value for certain tropical produce where the Philippines enjoys a significant market share and which we want to protect. **Thus, we can make conventional and organic agriculture work together in the Philippines!**

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Introduction

One of the key issues confronting Philippine agriculture (and the rest of the world!) is to what extent organic agriculture should be pushed to replace the current mainstream agricultural practices, also collectively referred to, as conventional agriculture.

The advocates of organic agriculture claim that the present chemical-based, industrial agriculture is unhealthy and unsafe to consumers and the producers (farmers) themselves, and destructive of the environment. Further, that organic produce are more nutritious and taste better.

The defenders of conventional agriculture, on the other hand, contend that these assertions are exaggerated and at best, only partly true.

The claimed advantages from the adoption of natural, environment-friendly practices are not exclusive to organic farming because the same practices are employed in conventional farming to varying degrees.

Among these common sustainable practices are: (1) minimum tillage for weed control, (2) mulching and fertilization with straws and other farm wastes, (3) use of legume cover crops, (4) use of conventionally-bred high yielding and pest and disease resistant varieties, (5) crop rotation and intercropping, (6) deployment of natural traps and biological control agents, and (7) use of beneficial microorganisms for soil enhancement and pest control.

The points of divergence between the two alternative farming systems are organic agriculture's complete ban on the: (1) application of chemical fertilizers, (2) use of chemical pesticides, and (3) adoption of genetically modified crops (GMOs) because of their alleged adverse effects. These fears are exaggerated and are not supported by science.

Definition of organic agriculture

According to the International Federation of Organic Agriculture Movements (IFOAM) "... organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions,

rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved..."

(<https://www.ifoam.bio/en/organic-landmarks/definition-organic-agriculture>).

The Organic Agriculture Act of 2010 (RA10068) states: "Organic agriculture ...covers areas such as, but not limited to, 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 this Act, and enhance productivity without destroying the soil and harming farmers, consumers and the environment as defined by the International Federation of Organic Agriculture Movement (IFOAM): Provided, That the biotechnology herein referred to shall not include genetically modified organisms or GMOS."

Conventional agriculture: use of chemical fertilizers, chemical pesticides, and GMOs

Contrary to the assertions that chemical fertilizers are harmful to soils, long-term field experiments, some dating as early as 1856, have demonstrated that the productivity of farm lands continuously cropped with wheat, maize, soybean and rice can be sustained indefinitely with judicious moderate applications of chemical fertilizers.

The well-known Rothamsted Station plots in England which had been sown to wheat and applied with chemical fertilizers since 1856 are still growing wheat. The Morrow plots at the University of Illinois in the USA had been growing maize and soybean with fertilizers since 1876. And in the Philippines, the Chandler plots at the International Rice Research Institute (IRRI) in Los Baños had been growing rice since 1963 and are still producing 20 tons of palay a year.

Again, contrary to the fears of organic advocates, there is a global scientific consensus that GMO crops are as safe (or no more risky) compared with conventionally-bred varieties. Even now more valuable planting materials with

novel traits are being developed utilizing recent advances in genome editing and synthetic biology.

Since 1996, when GMOs were first introduced commercially, 11 species of GM crops have been grown in 26 countries involving 17 million farmers. Over this 22-year period, 2.5 billion hectares of GM crops have been harvested worldwide. But to date not a single instance of alleged allergenicity nor poisoning has been recorded or confirmed.

The brief against GMOs is bereft of scientific bases. Unlike climate change where there are still a few significant scientific hold outs, there is a global scientific consensus on the safety of GM crops relative to their conventionally-bred counterparts.

The World Health Organization (WHO) of the United Nations, the European Commission (in spite of prevalent adverse national legislations against GMOs), the Royal Society (UK), and the American Association for the Advancement of Science (AAAS) have issued formal statements supporting the safety of GMOs. Similar formal declarations of support for the safety of GM crops have been issued by the world's leading national academies of science in the USA, UK, China, India, Brazil, Mexico, the Third World Academy of Sciences (TWAS), and our very own National Academy of Science and Technology Philippines.

Organic agriculture: production, environmental impact, and food security

The bottom line is that the non-use of chemical fertilizers and synthetic pesticides generally results in lower yields, less protection and higher costs for organically grown crops. The demonstrated yield penalties per US Department of Agriculture (USDA, 2014) studies could amount to as much as 45% in cotton, 35% in corn and 31% in soybean. And in order for the organic farmers to recover income loss, organic produce have to be sold at a premium, making food more expensive to consumers.

Moreover, from the environment point of view, lower yield from organic crops mean that globally, more natural forests and grasslands need to be plowed under to produce the same amount of food for the world's ever-growing population.

More lands under cultivation mean more soil erosion, more river, seas and aquifer pollution, and greater loss of habitat, and thereby, greater loss of biodiversity.

Given the foregoing, it is clear that organic farming in the strict formal sense cannot be the mainstream means of food production in our country. Organic production will raise food costs and make more Filipinos food insecure. Besides with our high population and limited availability of arable lands, there is little scope for further expansion of farm lands to make up for the loss of tonnage associated with organic farming.

On the other hand, there is a rapidly growing demand for organic produce among affluent consumers mainly in Europe, USA and Australia. Since 1999 farmlands devoted to organic farming have grown from 11.0 million hectares to 69.8 million hectares (1.4% of world total farm lands). In 2017, the value of organic foods and beverages were worth US\$97.8 billion (4.1% of the total agricultural produce of US\$2.4 trillion).

The export of tropical organic products is a trading opportunity we cannot afford to ignore.

Recommendations: Enjoying the best of both worlds

There are pros and cons to the two alternative farming systems. Modern, conventional agriculture have led to higher productivity and more efficient use of resources, particularly land and labor. However, the excesses in the use of chemicals have led to adverse consequences in the sustainability of the environment.

Therefore, there is a strong case to be made for a return to the many environment-friendly practices preached by organic farming.

However, the rigid exclusion in organic farming of the use of chemical fertilizers, synthetic pesticides and GMOs is an over-reaction and controverted by science.

In the case of fertilizers, the correct approach is a judicious mix of both organic and chemical fertilizers. Chemical fertilizers provide

sufficient nutrient density and timeliness of major nutrients for optimum crop growth. The organic fertilizers, on the other hand, provide: (1) organic matter for better soil structure for root aeration and proper drainage, (2) trace elements, and (3) beneficial soil microorganisms, important components not found in the former.

In the case of pesticides and GMOs, advances in science, particularly chemistry, genome editing, nanotechnology and synthetic biology, are promising new pesticides which are more effective and less toxic as well as crops with novel traits. But because they are man-made and do not exist in nature as such, they will not pass muster under the organic label. Depriving farmers and consumers of these future technologies, potentially more productive, healthier, and safer options is myopic and mindless.

Still and all, there are at least three niches where formal organic agriculture makes economic practical sense, namely: (1) at the household level, using freely available kitchen and farm wastes and making better use of unpaid family labor; also in school and community gardens, (2) for domestic farm- and eco-tourism as attractions, demonstrating sound ecology, proper human nutrition, and health and wellness i.e. organic foods, herbals, and supplements, and (3) for global export to create greater value for certain tropical produce where the Philippines enjoys a significant market share and which we want to protect.

In particular, we are the world's leading exporter of bananas and pineapple. Affluent consumers in the United States, many parts of Europe, Japan, South Korea, and now China, are willing to pay the premium for organically grown bananas and pineapple. We should set aside certain areas for organic banana and pineapple production to protect our share in the market.

Equally compelling is the new growing global market for coconut water and coconut cream (substitute for cow's milk) in various plant-based food formulations. Similarly, we should develop the technologies for the organic culture of high-yielding coconut hybrids intercropped with organic coffee, cacao, and other fruit crops for export.

This is a great opportunity to expand food exports and to multiply the income of our poor coconut farmers, who have been suffering from depressed coconut oil prices.

Indeed, we can make conventional and organic agriculture work together in the Philippines!

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