

Farmers' Perception on the Health and Environmental Benefits of Organic Rice Production in the Philippines: Implications for Further Policy Research

GUINEVERE T. MADLANGBAYAN^{1*} and AGNES C. ROLA²

ABSTRACT. Conventional rice production with the use of chemicals was found to have negative externalities both to the farmers' health and the farming environment. Organic agriculture technologies were developed to minimize such impacts. This paper explores the empirical support of the health and environmental benefits of organic agriculture by generating data from a survey of rice farmers and focus group discussions in rice farming communities. The respondents came from rice farming areas in the country where early adoptors of the organic rice farming system were located. The results of the analysis suggest that farmers fail to recognize the relationship between the perceived social benefits with economic benefits that they could derive from adopting organic agriculture farming system. Future policy research using multidisciplinary approaches is recommended where technical data can support the socio-economic analysis.

Keywords: *organic agriculture, rice, farmer health, farming environment, Philippines*

¹University Researcher, College of Public Affairs and Development (CPAf), University of the Philippines Los Baños (UPLB), Laguna, Philippines

²Professor, CPAf, UPLB, Laguna, Philippines

*Corresponding author: (+63 49) 536-3455, gtmadlangbayan@up.edu.ph

INTRODUCTION

Agricultural growth in the past five decades was mostly driven by the use of modern technologies including chemical inputs deemed to be harmful to both health and the environment. The rise of sustainable agriculture paradigm was basically to reverse the technological menu toward more health and environment-friendly technologies. Ikerd (2001) defined organic farming as farming for permanence, ensuring the sustainability of agriculture and eventually, the sustainability of human society through agriculture. Organic farming is seen to promote and enhance agri-ecosystems and human health. Organic farming systems rely on crop rotations, crop residues, animal manures, legumes, green manures, off-farm wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity; to supply plant nutrients; and to minimize insects, weeds, and other pests (Sullivan, 2003). In short, organic farming is a valid substitute for traditional farming, with the chemical technology found to have impacts on farmers' health (Rola & Pingali, 1993) and the environment (Pingali & Roger, 1995).

Based on the Research Institute of Organic Agriculture (FiBL) survey released in 2016, there were 172 countries with organic activities as of 2014. The largest organic agricultural land was registered in Australia with 17.2 million ha as of 2013. This was followed by Argentina with 3.1 million ha and the United States of America with 2.2 million ha in 2011. It was also reported that in 2014, there were 43.7 million ha of organic agricultural land, which includes in-conversion areas (Willer & Lernoud, 2016).

In 2015, developments were being encouraged by governments in Asia. Developments ranged from efforts to expand production areas to improvements in regulatory areas such as streamlining of certification rules. Lao PDR drafted its National Organic Development Strategy. Malaysia was resolving issues in its national organic labelling regulation. Thailand included organic agriculture agenda in its revamped Ministry of Agriculture and Cooperative (Ong, 2016).

In the Philippines, awareness of organic products came as an incidental by-product of a study conducted in the mid-1980s, which revealed the negative effects of the continued use of chemicals used to boost productivity in rice. In a United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) study in 2002, the Farmer Assistance Board, a non-government organization, published "Profits

from Poison”, which revealed the negative impacts of chemical-based farming. This was followed by the publication of the book “The Miracle That Never Was”, which showed that Filipino farmers were economically better off before the introduction of the Green Revolution in the 1960s. Green Revolution was a government-led program that introduced chemical-based agriculture in the country. Results of these studies spread that eventually led to the rise of a farmer-scientist partnership called MASIPAG, which is an acronym for *Magsasaka at Siyentipiko para sa Ikaunlad ng Agham Pang-Agrikultura* (Farmer-Scientist Partnership for Development) (UNESCAP, 2002).

Institutional Evolution of the Organic Agriculture Technology

Organic agriculture in the Philippines is a product of combined efforts from the private sector and the government. The private sector initiated the move towards establishing a certification body and unified set of standards for organic products in the country. The growing demand for organic products in the international market triggered the shift to organic products.

As early as 1996, a series of consultation meetings with the organic producers and prime movers of sustainable agriculture in the country had already been done. Through their efforts, the need to establish the Philippine National Standard for organic products and processing was recognized. The Philippine members of the International Federation of Organic Agriculture Movement-Asia (IFOAM-Asia), who attended the IFOAM Association in Korea, were also part of the consultation process.

In 1999, the Philippines hosted the 4th International Federation of Organic Agriculture Movement-Asia (IFOAM-Asia) Scientific Conference and General Assembly. The event was participated by 400 local producers and 90 producers from Europe and Asia. Through the conference, the need for a national certification and inspection body was identified. Likewise, the initial seed fund for the establishment of such body was created. During the IFOAM Scientific Conference in Basel, Switzerland in 2000, the core players in the local industry were able to negotiate for a consultancy support from FiBL and to develop the local capabilities in setting standards for inspection and certification also from FiBL.

Through the Organic Technical Working Committee (OTWC), the FiBL was commissioned to review the Organic Certification Standard of the Philippines. In June 2001, a workshop was held to finalize the "Certification Standards of the Philippines" and the certifying body was called "Organic Certification Center of the Philippines (OCCP)" (OCCP, 2012).

In December 2005, then President Gloria Macapagal Arroyo signed Executive Order 481 (EO 481), which calls for the promotion and development of organic agriculture in the Philippines. The following actors were identified: Department of Agriculture (DA), National Organic Agriculture Program (NOAP), and National Organic Agriculture Board (NOAB). DA and NOAP are primarily responsible for the formulation of regulations and guidelines; certification and accreditation; market promotion and networking; organic information for producers, handlers, and processors; and research, development, and extension. The NOAB is chaired by the DA secretary, while the secretaries of the Department of Trade and Industry (DTI) and the Department of Health (DOH) serve as vice-chairs. Other members of the Board include the secretary of other government agencies such as Department of the Interior and Local Government (DILG), Department of Environment and Natural Resources (DENR), and the Department of Science and Technology (DOST).

EO 481 also states that the NOAB shall appoint seven representatives who are engaged in organic agriculture. The representatives include, but are not limited to the following recommended sectors: a) three representatives from the private sector operating an organic farm, organic handling and processing, and establishment with significant trade in organic products; b) two from non-government organization (NGO)/people's organization (PO), who represent public interest or consumer interest; c) one from the organic certifying body (under Section 8 of EO 481); d) one from the academe with expertise in areas of environmental protection and resource conservation, toxicology, and biochemistry. Members of the Board have a fixed term of office of three years. A National Technical Committee (NTC) is likewise created to serve as the implementing arm of the policies and programs identified by the Board.

The Bureau of Agriculture and Fisheries Product Standards (BAFPS) serves as the Technical Administrative Secretariat of the Board and the NTC (EO 481, s. 2005). In June 2013, BAFPS was renamed Bureau of Agriculture and Fisheries Standards (BAFS) by virtue of Republic Act (RA) 10601, also known as the Agriculture and Fisheries Mechanization (AFMECH) law.

Another certification body accredited by the DA is the Negros Island Certification Services (NICERT) (formerly NISARD Certification). It offers inspection and certification services to organic producers, traders, handlers, processors, and retailers (NICERT, 2014). Based in Negros Occidental, Philippines, NICERT is one of the only two third-party certifying bodies in the country. The other one is the OCCP.

The concerted efforts of the various government, non-government organizations, and private institutions advocating organic agriculture gave rise to the eventual enactment of RA 10068, otherwise known as the Organic Agriculture Act of 2010.

Ara (2002) asserted that Filipino farmers can benefit from organic farming in two ways. First, organic farming can help alleviate poverty at the farm level since the cost of inputs in organic production is much lower compared to conventional farming. Second, organic farming can improve soil fertility, environment, biodiversity, water quality, and the health of farmers. In the same study, soil acidity, water pollution, and death of beneficial insects and animals were attributed to conventional farming associated with intensive use of chemical fertilizers.

While earlier studies focused on the benefits that can be derived from organic farming, there are also efforts to ascertain the level of awareness and the eventual acceptability of such undertaking. Piadozo et al. (2014) published a study on the level of awareness, acceptability, and implications of organic agriculture. Their study made use of a survey data collected in 2011. The study concluded that generally, there was a low level of awareness about the organic agriculture concept among rice farmers in major rice-producing regions in the Philippines. The main source of knowledge of the rice farmers were NGOs and private institutions. It was also mentioned that the lack of awareness and access to support services provided by both government and private agencies resulted in poor compliance to the Philippine National Standard for Organic Agriculture (PNSOA).

The Philippine government must invest in various support services to fully internalize the benefits of the organic agriculture program. Investments from international aid agencies in support of these activities would also play a vital role. These investment supports are similar to what governments and international aid agencies did when they supported the shift to chemical-based agriculture (Broad & Cavanagh, 2012).

The purpose of this research is to provide information on the perceived health and environmental implications of adopting organic agriculture in the Philippines. There is a need in the literature especially in the Philippines to explain these implications, which are unknown at this time, from a quantitative study of a larger sample of farmers. This study aimed to determine the indicative health and environmental benefits of practicing organic agriculture using farmer's perception. A structured household survey was conducted and followed by the conduct of focus group discussions with the members of the rice-farming community.

METHODOLOGY

The data collection was initially done in conjunction with the farm survey on the economics of organic agriculture (Pantoja, Badayos, & Rola, 2016). The survey included variables on technological practices, cost and returns analyses of organic rice farmers (ORFs) and conventional rice farmers (CRFs) and health and environmental benefits, and costs of using organic technologies. The quantitative data on the perceived health and environmental benefits of organic agriculture revealed that rice farmers were unable to quantify or translate their perceived benefits into monetary terms. A subsequent qualitative data collection using focus group discussion (FGD) was done and descriptive analysis was employed.

The study covered four provinces of the Philippines that have large rice production areas and observed early adoptors of organic agriculture (OA). Respondents were chosen from Camarines Sur, Iloilo, Negros Oriental, and Negros Occidental. Individual survey was conducted involving a total of 197 farmer-respondents. Out of these, 109 were ORFs and the rest were CRFs. The frequency of respondents per method of analysis and classification of farmers is listed in Table 1.

The FGD participants, particularly ORFs, also came from the same organization of farmers who are known to be practicing organic farming system. The CRFs were selected from the nearby municipalities where the ORFs were located. For the whole study, a total of 12 FGDs were conducted, distributed evenly across provinces and by respondent type. A total of 149 farmers attended the FGDs: 71 organic and 78 conventional farmers. To establish the existence of health and environmental benefits derived from organic rice farming in the Philippines, a comparison of perceptions and firsthand experiences of farmers was done.

Table 1. Frequency of distribution by type of rice grower, Philippines 2013

ITEM	ORGANIC RICE FARMERS	CONVENTIONAL RICE FARMERS	TOTAL
Focus Group Discussion			
Camarines Sur	29	31	60
Iloilo	42	47	89
Sub-total	71	78	149
Farmer Survey			
Camarines Sur	53	34	87
Iloilo	26	54	80
Negros Oriental	25	0	25
Negros Occidental	5	0	5
Sub-total	109	88	197
Total	180	166	346

Descriptive statistical analyses were used to analyze the primary data from the farmers' survey. Comparative qualitative analysis was done for the FGD data.

RESULTS AND DISCUSSION

Quantitative results. The individual survey which covered the farmers' perceptions on human health and environmental benefits of organic agriculture were analyzed using descriptive statistics.

Human Health

In the individual farmer survey, the ORFs and the CRFs were asked about their perceptions on the possible health hazards posed by the conventional farming system in rice production. Farmers were asked if they experienced any type of illness when they were still producing rice by conventional means. The survey revealed that 60 percent of the rice farmers covered in the study did not experience any type of illness. Only 54 percent of those who got sick consulted a medical doctor. Comparing the experience of ORFs and CRFs, 49 percent of the CRFs got

sick as compared to only 34 percent of ORFs. The ORFs reported that they got sick while they were producing rice by conventional methods (Table 2). Piadozo et al. (2014) stated that consumers not only benefit from eating organic products. The farmers and their families also benefit from organic farming practice by avoiding the ingestion or inhalation of chemicals that may cause serious ailments.

Table 2. Perceptions of organic and conventional rice farmers on health hazards of producing conventional rice, farmer survey results, Philippines 2013

PERCEPTIONS	ORGANIC (n=109)		CONVENTIONAL (n=88)		TOTAL (n=197)	
	No.	%	No.	%	No.	%
Experienced illness while producing conventional rice						
Yes	37	34	43	49	80	40
No	72	66	45	51	117	60
Type of illnesses ^a						
Cough	5	14	11	26	16	20
Asthma	9	24	4	9	13	16
Headache	5	14	6	14	11	14
Consulted with a medical doctor						
Yes	18	49	25	58	43	54
No	19	51	17	40	36	45
No response			1	2	1	1
Total	37	100	43	100	80	100

^aMultiple responses, listed only the top 4 responses

Soil Condition

The survey results showed that 80 percent of the ORFs believed that OA farming practice has a positive effect on soil (Table 3). The CRFs registered a much lower number at 56 percent. This could mean that improving soil condition could be one of the indicators that motivated rice farmers to shift to OA. Soil improvements were seen in the form of changes in soil quality, structure and texture, and acidity. A much higher

percentage of CRFs (78%) as compared to ORFs (75%) were able to associate the improvements on soil condition with the cost of production. This means that while ORFs are aware of the physical or physico-chemical improvements brought about by adoption of OA as a farming system, they could not easily associate or translate such improvements into monetary terms.

The farmer survey also revealed that almost 70 percent of rice farmers (organic and conventional) believe that organic rice farming system has an effect on soil quality. The effect of organic rice farming system on soil comes in the form of changes in soil quality, fertility, structure and texture, and acidity.

The primary aim of organic rice farming is to effect change in the quality of the soil. This was also mentioned in the study done by Shepherd (2003), which stated that organic farmers pay attention to their soil as it is one of the primary principles behind organic farming. Majority of both ORFs (75%) and CRFs (78%) agreed that improvements in soil quality would allow them to save on costs (Table 3). However, further quantification on the details is still fuzzy at the moment as farmers find it hard to put values on these perceived savings. A more comprehensive economic valuation with technical parameters will be needed to do this. In India, similar findings were observed. Improved water holding capacity has allowed farmers to reduce the frequency of irrigation as well (Niggli, Early, & Orgozalek, 2007).

One of the observations considered as a sign of improved soil quality is the improvement in the water holding capacity of the soil. Giller et al. (2005) as cited in Niggli et al. (2007) reported that the macrofauna of the soil, referring to the existence of worms, ants, and termites, positively affects the water holding capacity of the soil. The soil macrofauna was also observed to have a positive effect on water infiltration, drainage, and soil aeration.

Altieri and Nicholls (2003) noted in their study that the ability of a plant crop to resist certain pest and diseases is related to the physical, chemical, and biological properties of the soil. It further stated that "soils with high organic matter content and active soil biology generally exhibit good soil fertility". The same observation was noted by Azadi et al. (2011), who stated that organic agriculture contributes positively in areas affected by soil degradation as an indirect result of the improvements in soil fertility. In addition, Niggli et al. (2007) pointed out that in the long run, application of organic manure influenced soil fertility at three different levels: biological, chemical, and physical.

Table 3. Perceptions of organic and conventional rice farmers on the effects of organic rice farming to soil quality, farmer survey results, Philippines, 2013

PERCEPTIONS	ORGANIC (n=109)		CONVENTIONAL (n=88)		TOTAL (n=197)	
	No.	%	No.	%	No.	%
With effect on soil quality						
Yes	87	80	49	56	136	69
No	22	20	38	43	60	30
No response	0	0	1	1	1	1
Effects on soil ^a						
Soil quality	55	63	23	47	78	57
Soil fertility	19	22	11	22	30	22
Soil structure and texture	10	11	5	10	15	11
Soil acidity	8	9	7	14	15	11
Perception on savings/costs						
Yes	65	75	38	78	103	76
No	13	15	9	18	22	16
No response	9	10	2	4	11	8

^aMultiple responses, listed only the top 4 responses

Meanwhile, long term application of pesticides yielded negative effects. A study conducted by Hasegawa, Furukawa, and Kimura (2005) provided the information that fine tuning the nutrient input of organic fertilizers depend on the quality of the compost and the reallocation of chicken/cattle compost used among organic fields. Hasegawa et al. (2005) arrived on this conclusion in their study on on-farm amendments effect on nutrient status and nutrient use efficiency of organic rice fields in Northern Japan. The case study by Bitan (2009) reported that organic agriculture sequesters carbon from the air through crop rotation and use of cover crops. It was also mentioned that “biological nutrition sources pulls out carbon out of the atmosphere and store it in soils.”

Pretty et al. (2001) stated in a study that agriculture produces both negative and positive externalities. It was also mentioned that there is no comprehensive method or framework to help put value on these externalities.

Water

The perceptions of ORFs and CRFs on the effect of organic rice farming on ground water and paddy water were likewise assessed. The farmer survey revealed that only 35 percent of the ORFs and 51 percent of CRFs perceived that OA has affected water quality. The perceived effect comes in the following forms: safe water for humans and for natural enemies of pests, and reduced chemical contamination. Other related positive effects mentioned were growth of plants in ditches, increased water table, and higher yield. A higher percentage of CRFs (75%) as compared to ORFs (63%) perceived that production costs/savings could be attained due to the perceived effects on water.

In order to quantify the claim on perceived costs/savings, the respondents were asked to give estimates. Only 19 from ORFs while only three from CRFs were able to give monetary estimates. These results show the inability of farmers to quantify or put monetary value on their perceived production costs/savings. Improvement of water quality may be an indicator that the ORFs considered when they shifted to OA but they are not yet capable of putting value on such improvement.

Both organic and conventional rice farmers had difficulty assigning monetary values to the observed changes in water quality. As a result, estimates of perceived savings and costs were arbitrary and with high variability (Table 4). Thus, there is a the need for such explanation in a subsequent analysis. These results are observed to be congruent with Niggli et al. (2007) who reported that organic agriculture helps remove pollutants in the aquatic environment as a result of the prohibition on the use of pesticides and inorganic fertilizers.

Biodiversity

Both ORFs and CRFs were asked about their perception on the effect of organic rice farming system through change in cropping patterns on biodiversity. Survey results showed that a higher number of ORFs (58%) believed that organic rice farming has an effect on biodiversity as compared to CRFs (47%) (Table 5). When the ORFs were asked on how rice farming affects biodiversity, the rice farmers said that the organic rice farming system allowed the presence of diverse kinds of animals and insects, prevents air pollution, and makes improvements in the overall ecosystem/environment/ecology. In terms of the cost estimates, rice farmers believe that they did not incur any cost when they shifted

Table 4. Perceptions of organic and conventional rice farmers on the effects of organic rice farming on water quality, farmer survey results, Philippines, 2013

PERCEPTIONS	ORGANIC (n=109)		CONVENTIONAL (n=88)		TOTAL (n=197)	
	No.	%	No.	%	No.	%
With effect on water quality						
Yes	38	35	45	51	83	42
No	71	65	42	48	113	57
No response	0	0	1	1	1	1
Effects on water ^a						
Safe water for humans and for natural enemies of pests	21	55	14	31	35	42
Reduction in chemical contamination	6	16	15	33	21	25
Other related (+) effects ^b	7	18	10	22	17	20
Perception on savings and costs						
Yes	24	63	3	75	27	64
No	11	29	1	25	12	29
No answer	2	5	0	0	2	5
Do not know	1	3	0	0	1	2
Estimated savings/cost (in Php) ^c						
No. of respondents	19		3		22	
Minimum value	0		500		0	
Maximum value	5,000		2,000		5,000	
Average	744		1,166		802	

^aMultiple responses, listed only the top 3 responses^bGrowth of plant in ditches, increased water table, higher yield^cIncluded 131 respondents only

Table 5. Perceptions of organic and conventional rice farmers on the effects of a change in cropping pattern on biodiversity, farm survey results, Philippines 2013

PERCEPTIONS	ORGANIC (n=109)		CONVENTIONAL (n=88)		TOTAL (n=197)	
	No.	%	No.	%	No.	%
Do you think there is an effect in biodiversity as a result of changed cropping pattern?						
Yes	63	58	41	47	104	53
No	46	42	46	52	92	47
No answer	0	0	1	1	1	1
Perceived effect on biodiversity? ^a						
Presence of diverse kind of insects/ animal life	19	30	17	41	36	35
Prevention of air pollution	9	14	4	10	13	13
Overall improved ecology/ ecosystem/ environment	6	10	5	12	11	11
Do you think that you are incurring costs in producing organic rice because of the perceived change in cropping pattern? ^b						
Yes	14	13	0	0	14	11
No	60	55	14	64	74	56
No answer	35	32	8	36	43	33
Sub-total	109	100	22	100	131	100

^aMultiple responses, listed only top 3 answers

^bAsked from 131 respondents only

to organic rice production. Benefits are not also quantifiable, according to them. Further, based on the farmer survey, organic rice farmers plant traditional rice varieties. These observations are attuned with the study results of Niggli et al. (2007) which concluded that organic agriculture promotes biodiversity “below and above ground.” Bachman, Cruzada, and Wright (2013) in their study of MASIPAG organic rice farms noted that there is a higher diversity of crops, livestock, and rice varieties for full organic rice practitioners. It was also mentioned that conventional farmers on the average use 30 different crops, which is 15 crops lower than what an average organic farmer utilizes.

The use of traditional rice varieties are common for organic rice farmers. Given that these are traditional rice varieties, crop variety and climate resiliency relationship can also be a potential research opportunity.

Qualitative results. The paucity of the data collected from the individual farmer survey led to the creation of an instrument to guide the conduct of the FGD in the following areas of interest: human health, soil, water, biodiversity, and air. The perceptions of the ORFs and the CRFs were compared.

Human Health

The FGD results revealed that ORFs associated a number of health benefits to the practice of organic rice farming. Among the benefits attributed to organic rice farming were the following: avoidance of diseases, chance at a longer human life span, feeling younger in body and mind, practice of healthy lifestyle, and experiencing a positive “feel good” effect (Table 6). ORFs were once CRFs too. As such, their perception and experience with conventional rice farming was also asked.

ORFs who have devoted a portion of their land to organic production for home consumption also reported improved ability to maintain their perceived ideal weight. Others reported improved eyesight.

Given that the CRFs interviewed have not yet dabbled into organic rice farming, they were asked about the health effects of conventional rice farming to their health. CRFs attributed a number of illnesses to their farming practice ranging from low impact illness such as skin irritation to debilitating diseases (Table 6). These are similar

Table 6. Health effects of organic rice farming as compared with conventional rice farming by farmer type, FGD results, Philippines, 2013

TYPES OF FARMING/ RESPONDENTS	POSITIVE EFFECTS	NEGATIVE EFFECTS
Organic Rice Farming		
According to organic rice farmers	• Avoidance of certain diseases • Chance at a longer life span (human) • Promotes healthy lifestyle • Younger body and mind • "Feel-good" effect	
Conventional Rice Farming		
According to organic rice farmers		• Becoming unconscious after spraying • Experiencing asthma attacks lung problems, skin irritation, coughing • Feeling dizzy, extremely tired/over fatigue, vomiting after spraying • Suffering from cancer, diabetes tuberculosis, heart ailments • Death secondary to illness due to spraying
According to conventional rice farmers		• Causes cancer, asthma, ulcer, high blood pressure, over fatigue, pneumonia, rheumatism, dizziness, lung failure, heart failure, nausea, skin irritation, toenail deformation • Aggravate wound infection • Shorten lifespan of farmers

diseases that have previously been captured in the literature as a result of conventional or chemical farming (Pingali, Marquez, Palis, & Rola, 1995). The conventional farmers observed that their fellow farmers have shorter lifespan now than about a generation ago, despite the more modern medical technologies available at present. However, it should be noted that there are other factors that may have contributed to their observation such as the culture of not seeking a professional medical help at the onset of symptoms like fever. Another factor that may have contributed to this observation, but not covered in this study, is lifestyle diseases.

Safety measures in the application of synthetic chemicals have not been ingrained to most conventional farmers as one farmer related an incident where a fellow farmer with a moustache sprayed his rice, went home, washed himself but forgot to wash his face. He then prepared and drank a cup of coffee and became unconscious instantly thereafter. The simple explanation that was given is that the chemical-laden moustache got dipped in the cup of coffee which he drank. Other farmers related that prior to the introduction of organic farming, farmers in the field would drop to the ground “like flies” and they attributed this to the inhalation of insecticides.

Soil

Both organic rice farmers and conventional rice farmers associated negative effects to conventional rice farming, while positive effects were associated with organic rice farming (Table 7). This observation was also experienced by other researchers as noted in the study of Pretty (2001). The report discussed the agriculture’s multifunctional nature and mentioned that agriculture, in general, also produces positive externalities.

Water

Organic rice farmers found it difficult to assess the impact on water quality due to the absence of a water quality test as revealed in Table 8. They deemed it necessary to have some indicators to qualify the changes. Nevertheless, both organic and conventional rice farmers attributed negative effects of conventional rice farming to water. Skin irritation from paddy water, and death of fishes and other microorganism

Table 7. Effects of organic rice farming as compared with conventional rice farming on soil by farmer type, FGD results, Philippines, 2013

TYPES OF FARMING/ RESPONDENTS	POSITIVE FFECTS	NEGATIVE EFFECTS
Organic Rice Farming		
According to organic rice farmers	• Lowers acidity/ improves soil pH • Absence of chemicals in the soil • Presence of helpful microorganisms • Increases water holding capacity	
Conventional Rice Farming		
According to organic rice farmers		• Makes soil acidic • Lowers water holding capacity
According to conventional rice farmers		• Makes soil acidic • Depletes soil nutrient (e.g., zinc deficiency) • Changes soil structure (low water holding capacity) • Results to low soil fertility

in the paddy water were reported. Likewise, the water from the surrounding deep wells were reported to have been contaminated by chemicals used in conventional rice farming. Some reported changes in the taste of the water from the deep well. Others shared that water seemed to exude bad odor as well. This particular finding is supported by the report done by Bachman, Cruzada, and Wright (2013), stating that high application rates of fertilizer led to nitrate contamination of water, streams, and ground water reserves.

Table 8. Effects of organic rice farming as compared with conventional rice farming on water by farmer type, FGD results, Philippines, 2013

TYPES OF FARMING/ RESPONDENTS	POSITIVE EFFECTS	NEGATIVE EFFECTS
Organic Rice Farming		
According to organic rice farmers	No effect was ascertained as water quality has not yet been tested	
Conventional Rice Farming		
According to organic rice farmers		• Water in the paddy caused skin irritation • Kills fishes in the paddy • Water from deep wells became salty • Water is believed to be contaminated with harmful chemicals at tolerable levels
According to conventional rice farmers		• Contaminated water causes skin irritation • Water from paddies upon reaching the lakes kills fishes and other micro-organisms • Bad odor of water from deep well • Salty taste of water from deep well

Biodiversity

This study revealed that the type of rice farming practice had an effect on biodiversity. As to the degree of the effect, the farmer-respondents both in the FGD and in the farm survey had difficulty assigning monetary values and other quantitative indicators. In the FGD results shown in Table 9, organic rice farmers associated positive effects to organic rice farming system, while both ORFs and CRFs attributed negative effects on biodiversity to conventional rice farming system.

Table 9. Effect of organic rice farming as compared with conventional rice farming on biodiversity by type of farmer, FGD results, Philippines, 2013

TYPES OF FARMING/ RESPONDENTS	POSITIVE EFFECTS	NEGATIVE EFFECTS
Organic Rice Farming		
According to organic rice farmers	• Promotes balance between harmful and beneficial insects • Less odorous rice bugs • Presence of spiders and other beneficial insects • Promotes ecological balance • Presence of inland fishes, frogs, and earthworms	
Conventional Rice Farming		
According to organic rice farmers		• Mutation of insects, develops high resistance to chemical insecticides • Eradicates beneficial insects • Insect pest resurgence • Eradicates dragon flies, spiders, earthworms, and inland fishes
According to conventional rice farmers		• Problem with rice bugs (needs a stronger chemical combination) • Kills beneficial insects • Disappearance of frogs, spiders, native fish, friendly insects, and earthworms

CONCLUSIONS

Health and environmental benefits of the organic rice farming practice remain to be an interesting field of study in the Philippines. There are available literature on the impact of conventional farming to farmer's health, but the positive benefits of organic agriculture remain to be a contentious issue. One of the motivating factors in transitioning to OA is the perceived health and environmental benefits. Despite this, adoption of OA in the country remained limited. In this study, the health

and environmental benefits of OA based on the perception of organic and conventional rice farmers were compared and analyzed. ORFs and CRFs attributed perceived positive health and environmental benefits to organic rice farming system. However, the inability of farmers to quantify and put monetary value on the perceived benefits that have been identified from the practice of organic rice farming is an indicator that rice farmers in general have yet to fully understand the values that organic agriculture espouses.

The benefits on human health, soil quality, water quality, and biodiversity remain as abstract concepts to all rice farmers whether they are organic rice farmers or conventional rice farmers. Organic rice farming is still in its infancy, and there seems to be low uptake on the technology. This could be attributed to the farmer's inability to recognize the relationship between these social benefits with economic benefits.

RECOMMENDATIONS

Multidisciplinary research investments will be needed to appreciate more the social benefits and costs of organic agriculture. These studies on the human health and environmental effects of organic farming should focus on identifying quantifiable indicators, but these would need an interdisciplinary research approach. The expertise of water quality specialist, soil experts, and biodiversity experts to come up with the technical coefficients are needed in the valuation of the benefits of organic farming in developing countries. For example, the improved soil quality attributed to organic farming and how this will increase or stabilize yields will need soil yield coefficient values. The increase in water quality due to organic farming contributing to better quality yields is also an interesting study. Investigating the effect on stability of yields due to higher biodiversity index can also be requisite studies towards an economic valuation of the impact of organic production.

Results of these research activities can also improve the certification process as well as the standards set by the certifying bodies by generating local information for the health and environment indicators.

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