



ORGANIC FARMERS IN THE PHILIPPINES: CHARACTERISTICS, KNOWLEDGE, ATTITUDE AND PRACTICES

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ABSTRACT – Non-chemical use of farm inputs in organic farming can help alleviate problems of soil infertility as well as pollution in water and air. Organic farming, although sustainable may not be an attractive alternative to conventional farming because of low yield in the earlier years of adoption in spite of its being relatively laborious. Knowing the characteristics, knowledge, attitudes and practices of the organic farmers are necessary to promote organic farming in the Philippines. The survey of the 326 organic farmers in the nine provinces in the Philippines showed that the median age of organic farmers is 51. Forty-three percent are high school educated. More than three-fourths of the farmers have an average farm size of less than 2.5 hectares. Seventy-five percent were practicing organic farming, even before the Organic Agriculture became a law in 2010. The knowledge of the organic farmers on three aspects, namely: organic farming, environment and cost/benefits of organic agriculture (OA) were assessed while the attitude was likewise assessed on organic farming and its cost/benefits using a 5-point scale. Davao farmers have the highest mean knowledge and attitude scores on both OA and cost and benefit aspects. Cebu farmers, on the other hand, have the highest mean knowledge score on the environmental aspect. It was found that older farmers are more knowledgeable than the younger farmers on the aspect of benefit and cost of OA. Educational attainment affects positively the knowledge level on OA and on the environmental aspects. Selling OA products was found to increase their knowledge of the benefits and cost of OA but decreases their knowledge about the environment. The attitude of the farmers on all the three aspects was generally positive. The most common organic farming practices are composting and intercropping. Crafting trainings should be customized by province and should take into consideration the evidence-based characteristics, knowledge, attitude and practices of organic farmers to increase and sustain the practice of organic agriculture in the Philippines.

Keywords: attitude, characteristics, knowledge, organic farming, Philippines, practices

INTRODUCTION

As early as 1930s, organic agriculture (OA) was conceptualized as “an agricultural production system that avoids or largely excludes the use of synthetically compounded fertilizers, growth regulators, pesticides, livestock feed additives and genetically engineered products”. In the international arena, the International Federation of Organic Agriculture Movement (IFOAM) that represents every link in the production chain was finally formed in 1972 (Baradas et al. 2001). According to IFOAM’s definition,

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” (<http://www.ifoam.bio/>).

In the Philippines, OA was reintroduced through the enactment of Republic Act of 10068 also known as “Organic Agriculture Act of 2010” by the Department of Agriculture (DA) for the purpose of making agricultural production ecologically sound and economically viable system. The law established a comprehensive National Organic Agriculture Program (NOAP) as a guide in implementing of OA activities in the Philippines. By 2016, organic farming is envisioned to be practiced in at least 5% (483,550 ha) of the total agricultural farm areas in the Philippines (NOAP 2012-2016) but only 107, 911 ha was converted to OA. It is apparent from the data that the land area devoted to organic farming is rather small but the farmers who converted to organic farming has increased by 400% between 2011 and 2015. The statistics from the Philippine Information Agency (2016) has shown that in 2015, there were 43,000 organic farmers as compared to only 9,000 organic practitioners in 2011.

The practice of organic agriculture includes not only technical know-how but also the social knowledge and behavior of the practitioners. It is therefore the focus of the study to determine the knowledge of the organic farmers on the three aspects, namely: organic farming, environment and cost/benefits of organic agriculture (OA) was assessed while the attitudes of the organic farmers were determined on organic agriculture and its benefits and cost. It answered the many reasons for becoming organic farmers and describes the farming operation practices. The study further looked into the relationship of the socioeconomic characteristics of the organic farmers with their knowledge and attitudes. The succeeding sections will include: Materials and Methods, Results and Discussions, and Conclusion and Recommendations.

The framework used in this study is shown in Figure 1. Knowledge is the internalized learning based on scientific facts, experiences and/or traditional beliefs. Experience shows that knowledge is necessary but not sufficient to produce behavior change, which only occurs when perceptions, motivation, skills and the social environment also interact. Attitudes in this perspective are feelings, opinions or values that individual holds about a particular issue, problem or concern. Practices include all the actions taken to address the issue, problem or concerns. In this study, knowledge of the practitioners on OA, environment

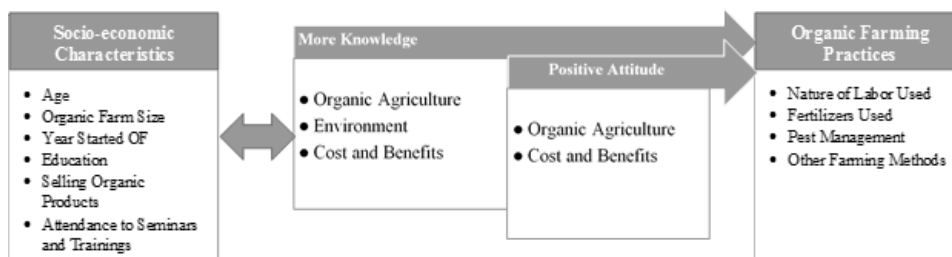


Figure 1. Relationship of characteristics of farmers with their knowledge, attitudes, and practices on organic agriculture.

and cost and benefits was hypothesized to be responsible for the development of positive attitudes towards OA and its benefits. The increase in knowledge and positive attitude will lead to a change in behavior which can be seen in the appropriate organic farming practices. In the long term, engaging in organic farming will lead to a healthy lifestyle, ecologically sound environment and sustainable livelihood for the farmers.

MATERIALS AND METHODS

The study was conducted from 2012 to 2014 in the nine provinces in the Philippines namely: Tarlac, Quezon, Camarines Sur, Iloilo, Negros Occidental, Negros Oriental, Cebu, Bukidnon and Davao. The nine provinces and the number of respondents for each province is shown in Figure 2.

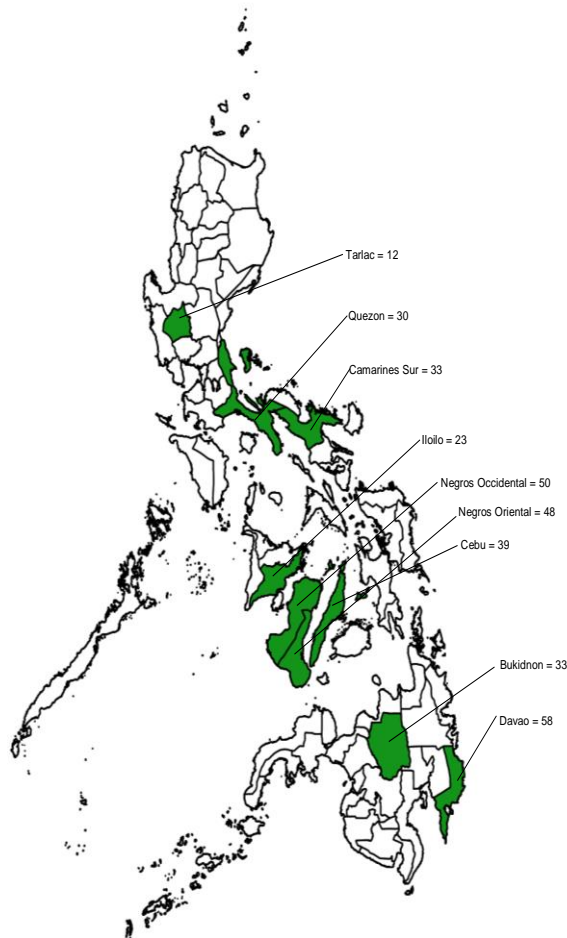


Figure 2. The nine selected provinces with the corresponding number of survey respondents.

The provinces were purposely selected by Department of Agriculture-Bureau of Agricultural Research (DA-BAR). The regional focal person provided the list of organic farmers association per province who also provided the estimated number of 5,600 registered members of organic farmers in the nine provinces. From the estimated number of organic farmer members, 360 was obtained using the designed-based sample size determination formula with a 5% margin of error. The formula reads:

$$n = NPQ(N - 1)[CV(SRS)XP]2 + PQ$$

Where

N = Population Size

P = Population proportion, (.50)

Q = (1- P) CV= covariance, 5%

Equation 1. Design-based sample size determination equation

There were, however, only 326 farmers who responded to the survey which is 90.5% of the total target sample size of 360 organic farmers. The content of the survey includes socioeconomic characteristics of the organic farmers and their knowledge, attitudes and organic farming practices. The knowledge part of the survey is about what they know about OA in general and OA in relation to the environment and their knowledge on the cost and benefits of OA. The attitude was on organic agriculture and its costs and benefits. The research instrument was developed by the project team using the 94 items from the literatures reviewed on the knowledge, attitudes and practices (KAP) a five-point attitude scale was used to indicate the degree to which farmers agreed to the statements: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree and 5 = Strongly Agree.

All the data gathered in the study were analyzed using Statistical Packages for the Social Sciences (SPSS 17.0 Trial version). Percentages and averages were used to describe characteristics of organic farmers, as well as their knowledge, attitudes and practices. To determine relationship between the dependent variables, knowledge and attitude with selected independent variables, the appropriate correlational statistics were computed depending on whether the independent variables are interval, ordinal and nominal. For instance, interval variables such as age, farm size, and year started farming, Pearson Product Moment correlation was used. Spearman rank correlation was used for the variable, highest educational attainment while ETA correlation was computed for all the remaining nominal variables that were either answerable by Yes or No.

RESULTS AND DISCUSSIONS

Characteristics of Organic Farmers per Province

The characteristics of farmers related to their organic farming as shown in Table 1 are the factors that influence their knowledge, attitudes, and practices. The older the farmer, the more farming experience which inevitably contributes to more knowledge relative to younger farmers.

Half of the 326 farmers in the survey are under 50 years old. Less than half (43.2%) either reached the high school level or have a high school diploma. Those with elementary education comprised one-fourth (25.2%) of the total 326 farmers. This is also the composition (25.6%) of those with either

Table 1. Characteristics of farmers related to the organic farming (n=326).

Characteristics	Frequency	Total Percentage
Age Group (n=326)		
50 and below	167	51.2
above 50	159	48.8
Educational Attainment (n=317)		
Elementary	80	25.2
High school	137	43.2
Vocational	16	5.0
College	81	25.6
Post-graduate	3	0.9
Residential lot Status (n=317)		
Owner	224	68.9
Renter	30	9.2
living with relatives	68	20.9
Year Started Organic Farming (n=313)		
Before 2005	101	32.3
2005 to 2010	132	42.2
After 2010	80	25.6
Organic Farm size (n=320)		
< 1.0 hectare	157	50.6
1.0 to 2.5 hectares	140	27.8
> 2.5 hectares	23	21.6
Marketing of Products (n=323)		
For consumption only	25	92.3
For consumption and commercial purposes	298	7.6
Trainings Attended (n=326)		
Organic Farming	99	30.4
Vermiculture/Vermicomposting	99	30.4
Concoctions	81	24.8
Organic Crops-related	37	11.3

college education or with a college degree. With 43.2% of the farmers with high school education and the 25.6% percent with a college education, there are almost 7 out of 10 farmers had undergone either high school or college educational level. More than half of the organic farmers in the survey (68.9%) are residential lot owners. The renters are a minority (9.2%) while the rest were residing with relatives. The year when the organic farming started is significant to know, since it is indicative of what motivates them to engage in organic farming. Those who practiced before 2010, which is the enactment of RA 10068 showed that the law itself was not the motivating factor. The table shows that three-fourths (74.5%) started farming before 2010 and less than half of them (32.3%) have started before 2005, way before 2010. Those who started OA after 2010 comprised 25.6% of the farmers in the survey. It can be deduced that one-fourth of the farmers became organic farmers due to the promotion of OA as part of the Organic Act in 2010. Farm size planted with organic produce is small with 50.6% have below 1.0 hectares of organic farm while 27.8% of the farmers have 1.0 to 2.5 hectares devoted to organic farming. The farmers who till large organic farm land (more than 2.5 hectares) is 21.6%. Most of the sources of knowledge acquired by organic farmers are from trainings. Organic trainings they have attended are on organic farming and related organic practices. As shown in Table 1, 92.3% of the farmers produce organic crops for home consumption while only 7.6% sell their produce commercially.

Table 2 shows the characteristics of the farmers by province. There are almost equal number of male and female farmers in Quezon, Iloilo, Negros Oriental and Bukidnon. Except in Davao province

Table 2. Socio-demographic and farm characteristics of Organic farmers by province, in percent.

Variables	Provinces											Total (n=256)
	Tarlac (n=12)	Quezon (n=30)	Comarines Sur (n=52)	Iloilo (n=23)	Negros Occidental (n=50)	Negros Oriental (n=48)	Cebu (n=39)	Bukidnon (n=35)	Davao (n=58)			
Sex												
Male	66.7	50.0	62.5	56.5	72.0	50.0	66.7	51.5	25.9			53.4
Female	33.3	50.0	37.5	43.5	28.0	50.0	33.3	48.5	74.1			46.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0			100.0
Age												
Median (years)	58	50	44	55	49	49	52	51	47			51
<40 years old	0.0	10.0	24.2	8.7	14.0	14.6	10.3	12.1	22.4			14.7
40-55 years old	50.0	50.0	66.7	39.1	60.0	58.3	48.7	45.5	51.7			53.4
>55 years old	50.0	40.0	9.1	52.2	26.0	27.1	41.0	42.4	25.9			31.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0			100.0
Marital Status												
Ever Married	100.0	86.7	90.9	91.3	78.0	91.7	92.3	97.0	94.8			91.5
Not Married	0.0	13.3	9.1	9.7	22.0	9.3	7.7	3.0	5.2			9.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0			100.0
Education Level												
Elementary (1-6 years)	0.0	31.0	15.6	13.6	30.6	37.2	28.2	15.6	28.1			25.2
High School (7-10 years)	30.0	44.8	53.1	31.8	32.7	44.2	38.5	65.6	43.9			43.2
College (11 years and above)	70.0	24.1	31.3	54.5	36.7	18.6	33.3	18.8	28.1			31.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0			100.0
Farm Size												
Average (hectares)	6.35	2.81	2.22	2.40	2.03	1.04	1.72	1.72	1.82			1.71
<1.0 Ha	25.0	30.0	24.2	52.2	46.0	79.2	71.8	38.7	53.4			50.8
1-2.5 Ha	33.3	33.3	60.6	17.4	26.0	12.5	10.3	41.9	27.6			27.6
>2.5 Ha	41.7	36.7	15.2	30.4	28.0	8.3	17.9	19.4	19.0			21.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0			100.0
Organic Farm Size												
Average (hectares)	4.08	0.64	1.85	0.96	1.38	0.60	0.83	1.26	1.18			1.71
<1.0 Ha	66.7	83.3	37.5	91.3	68.0	89.6	84.6	60.7	66.1			50.6
1-2.5 Ha	8.3	13.3	56.3	4.3	20.0	8.3	7.7	28.6	28.6			27.8
>2.5 Ha	25.0	3.3	6.3	4.3	12.0	2.1	7.7	10.7	5.4			21.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0			100.0
Years Started OF												
Before 2005	8.3	20.0	54.5	26.1	32.0	37.5	20.5	17.4	43.6			32.3
2005-2010	50.0	36.7	45.5	34.8	66.0	47.9	33.3	13.0	36.4			42.2
After 2010	41.7	43.3	0.0	39.1	2.0	14.6	46.2	69.6	20.0			25.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0			100.0

where three-fourth of the farmers were female, the rest of the provinces like Tarlac, Camarines Sur, Negros Occidental and Cebu have more male farmers than female farmers. The median age of the farmers was from 44 to 58 years old. The highest median age was found among Tarlac farmers while the youngest organic practitioners were from Camarines Sur. Majority of the farmers belong to age category, 40 to 55 years old, in Camarines Sur (66.7%), Negros Occidental (60.0%), Negros Oriental (58.3%), Davao (51.7%), Quezon (50.0%), Cebu (48.7%) and Bukidnon (45.5%). On the other hand, majority of the farmers from Iloilo (52.2%) were more than 55 years old. Half of the farmers in Tarlac were aged 40-55 years old while the other half were more than 55 years old. Majority of the farmers in the nine provinces are married (87-100%). Compared to the rest of the provinces, married farmers in Negros Occidental is lower (78.0%). As shown in Table 2, majority of the farmers in Tarlac (70.0%) and Iloilo (54.5%) have reached tertiary level of education. Most of the farmers in Bukidnon (65.6%), Camarines Sur (53.1%), Quezon (44.8%), Negros Oriental (44.2%), Davao (43.9%) and Cebu (38.5%) have at least secondary level of education. Three out of ten farmers have elementary education in the provinces of Quezon, Negros Occidental, Negros Oriental, Cebu and Davao.

The farm size of the farmers is between 0.5 to 2.5 hectares. Half of the farmers (50.8%) have less than 1.0 hectare of farm devoted to organic farming. Twenty-eight percent (28%) have 1.0-2.5 hectares. The average farm size devoted to organic farming is 1.71 hectares. The average farm size of 6.35 in Tarlac deviates from the other provinces. This is because one farmer declared ownership about 15 hectares which he leases to other farmers. The size of the farm devoted to organic farming is much smaller which is between 0.60 hectares to 4.08 hectares. Again, the average farm size devoted to organic farming in Tarlac was greater than the other provinces because of the reason stated above. Aside from Tarlac, Camarines Sur has an average of 1.85 hectares of organic farm (Table 2).

Republic Act 10068 was enacted in 2010. But there was an Executive order that was passed by former President Gloria Macapagal-Arroyo in 2005. As shown in Table 2, half of the farmers in Tarlac, Negros Oriental and Camarines Sur started organic farming between 2005 and 2010. This was the time when Executive Order and Republic Act of 10068 were passed in 2005 and 2010, respectively. More than half (55%) of the farmers in Camarines Sur and 44% in Davao, and 38% in Negros Oriental have started organic farming even before the Executive Order was released in 2005. Most of the farmers in Iloilo (39.1%), Cebu (46.2%) and Bukidnon (69.6%) were considered late adopters of organic farming since they started organic farming after the passage of the Republic Act. The findings from the survey revealed that the farmers' conversion to OA is characterized to be gradual where a portion of their farm is organic agriculture while continuing conventional farming in other portions of their farm. This practice of gradual conversion was observed in the nine provinces. This is to minimize risks in case organic agricultural technology may not be productive as conventional farming. The earliest adopters of OA were in 2005. As in any process of transition, the farmers experience lower income to no income due to decrease in yield during their first year of conversion to organic agriculture. The rationale behind this is that the soil takes longer time to be recover. This is the same reason why other farmers retain their conventional farming practice.

Organic farmers in the nine provinces seemingly credit their knowledge on organic farming by merely attending organic agriculture orientation programs rather than the trainings on organic farming technologies. However, the proportion of organic farmers who attends trainings is less compared to those who never attended as shown in Table 3. Initial exposure to organic farming is through attending orientations. Iloilo and Negros Oriental farmers more than other farmers in other provinces took this as an opportunity to learn about organic farming. Trainings on vermicomposting were popular among farmers in Quezon (64.5%) and Bukidnon (63.3%).

Table 3. Attendance to orientation and trainings of Organic farmers by province, in percent.

	Provinces									
	Tarlac (n=12)	Quezon (n=30)	Camarines Sur (n=32)	Iloilo (n=23)	Negros Occidental (n=50)	Negros Oriental (n=48)	Cebu (n=39)	Bukidnon (n=33)	Davao (n=58)	
Orientation										
<i>Organic Farming</i>										
Yes	45.5	19.4	48.5	52.2	34.7	68.8	38.5	20.0	55.9	
No	54.5	80.6	51.5	47.8	65.3	31.3	61.5	80.0	44.1	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Trainings										
<i>Vermicomposting</i>										
Yes	36.4	64.5	15.2	13.0	18.4	14.6	38.5	63.3	25.4	
No	63.6	35.5	84.8	87.0	81.6	85.4	61.5	36.7	74.6	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Organic Fertilizers</i>										
Yes	27.3	22.6	33.3	13.0	6.0	22.9	12.8	23.3	13.6	
No	72.7	77.4	66.7	87.0	92.0	77.1	87.2	76.7	86.4	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Concoctions</i>										
Yes	18.2	16.1	15.2	26.1	14.0	14.6	38.5	16.7	33.9	
No	81.8	83.9	84.8	73.9	84.0	85.4	61.5	83.3	66.1	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Farm Field School</i>										
Yes	0.0	22.6	21.2	0.0	8.0	8.3	12.8	23.3	1.7	
No	100.0	77.4	78.8	100.0	92.0	91.7	87.2	76.7	98.3	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<i>Organic-Crop Related</i>										
Yes	54.5	16.1	12.1	34.8	14.0	6.3	10.3	13.3	23.7	
No	45.5	83.9	87.9	65.2	86.0	93.8	89.7	86.7	76.3	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Knowledge, Attitudes and Practices on Organic Agriculture in the nine provinces

What we know and what we believe in, is somehow a reflection of our disposition towards many things. It is argued that the information in the form of knowledge governs our perceptions, opinions, and interests which give direction to what we do or practice (Nelson et al. 2016).

The source of knowledge of organic farmers is either from traditional knowledge and those derived from trainings and seminars. Traditional farming, which antedated the introduction of chemical agriculture, is handed down from one generation to the next and went through some modification by younger practitioners over the years. It is sometimes called local knowledge and the practice of natural farming is embedded into organic farming. This knowledge is often orally transmitted and are not documented and therefore not learned through formal education (Sumner, 2006). In addition to traditional knowledge, organic farmers complement it with innovative practices which they learned from attending seminars and trainings. Examples of these innovative practices are the use of vermicomposting as an alternative to commercial fertilizers and the use biological control agents to control pest. The organic farmers are set apart from the conventional farmers, since, unlike the latter their products need to pass a certifying body to authenticate that the process followed from seedling the management of the crops are organically acceptable and beneficial to the environment.

In this study, an organic farmer who is knowledgeable in organic farming knows that the use of chemical fertilizers and pesticides eventually lead to infertility of the soil and may eliminate beneficial insects together with harmful insects. Included in the knowledge of organic farming are awareness of the benefits of crop rotation, intercropping, cover crops and mulching. Moreover, they know that resistant varieties would reduce damage to crops due to pest, drought, flooding, etc. There are three interrelated aspects of knowledge on organic farming. These are OA in general, on the environment and on its cost and benefits.

The knowledge of organic farmers on the three aspects of organic farming was assessed using a 5-point scale of 36 items with a perfect score of 180 points. Table 4 shows the mean score of organic farmers by province. On the aspect of general knowledge on organic farming, the average mean scores of all farmers in the 9 provinces is 133.3. Relative to the other provinces, Davao and Iloilo farmers, both obtained a mean score of 137, the highest garnered on the general knowledge on organic farming.

About ten years ago, Negros Oriental and Negros Occidental signed a memorandum of agreement to work together to make the island “Organic Bowl of Asia”. Since then, the provinces have converted 10,000 hectares to organic land which served as an example for other provinces to follow. These provinces is therefore expected to have a better knowledge (<http://nbreport.ph/features/agriculture/how-negros-paved-the-way-for-organic-agriculture-gabyn-20180511/>), however, in this present study, farmers from Iloilo and Davao provinces have better knowledge on all aspects. In the case of Iloilo, farmers were more engaging in their organic farming practices due to the trainings provided by various institutions such as government agencies, non-government organizations and religious organizations in promoting organic agriculture. The province of Iloilo has a farmer who is a member of the National Organic Agriculture Board (NOAB) which is the Technical Working Group that represent the farming sector. In the case of Davao, the farmers were proactive in their sentiments against genetically modified organisms (GMOs). Banana growers from Davao have gained international certification for their products which means having passed the international standards is tantamount to ample knowledge on organic farming. Davao farmers are formally organized and being a member of an organic farmer organization provide them set of recommended practices that each member has to abide to maintain their bonafide membership.

Table 4. Mean knowledge score of organic farmers on organic agriculture, environment and the cost /benefit of organic agriculture.

Variables	Mean Knowledge Scores										Mean average score
	Tarlac (n=12)	Quezon (n=30)	Camari nes Sur (n=32)	Iloilo (n=23)	Negros Occidental (n=50)	Negros Oriental (n=48)	Cebu (n=39)	Bukidnon (n=33)	Davao (n=58)		
<i>Organic Agriculture</i>	134.6	132.8	130.9	137.1	131	133.4	133.3	129.4	137.2	133.3	
<i>Environment</i>	40.9	40.2	37.8	41.5	40.7	40.7	42.2	33.1	40.0	39.7	
<i>Cost and benefit</i>	43.3	42.3	42.0	43.7	42.7	42.8	44.1	44.5	44.7	43.3	

Table 5. Mean attitude score of organic farmers on organic agriculture, and the cost /benefit of organic agriculture.

Variables	Mean Knowledge Scores										Mean average score
	Tarlac (n=12)	Quezon (n=30)	Camari nes Sur (n=32)	Iloilo (n=23)	Negros Occidental (n=50)	Negros Oriental (n=48)	Cebu (n=39)	Bukidnon (n=33)	Davao (n=58)		
<i>Organic Agriculture</i>	98.8	95.1	99.2	100.8	99.0	100.9	103.5	90.4	101.5	98.8	
<i>Cost and Benefit</i>	33.6	34.2	35.7	36.5	32.4	35.4	36.3	33.0	38.6	35.1	

On the aspect of environment, the perfect score is 50 to 10 statements. Organic farmers in Bukidnon and Camarines Sur are two of the nine provinces that are less knowledgeable about the other relationship of organic farming to the environment. The benefits of organic agriculture on the environment is not immediate, but more likely to happen in the future and will directly have positive outcomes to the next generation of farmers. The immediate benefits are on the commercial value of organic products. The knowledge of the cost and benefit is operationalized using 12 statements with a total possible score of 60 points. The knowledge of cost/ benefit of the farmers do not differ significantly but Davao and Bukidnon farmers had a slight edge over the farmers in other provinces. It was observed that the farmers from these two provinces have recognized that the inputs required for organic farming is much less as compared to conventional farming. Davao farmers, in particular, derived their main income from farming organic bananas which have sustained their day to day needs (Table 4).

From the results, it can be gleaned that support of various institutions has played a big role in the knowledge attainment of the organic farmers. Through the various trainings and seminars conducted by these organizations, they are able to disseminate the nature and benefits of organic farming. In addition, membership and active participation in organic farmers' organizations provided a venue for knowledge-sharing among the members. Comparative and direct experiences on the benefits of organic farming with conventional farming is another source of knowledge for the farmers. Findings have shown that contacts of organic farmers to extension workers who directly provide information on organic practices, participation in programs such as farmers field schools serve to motivate and change the attitude, increase the knowledge and skills towards organic farming (Ghanim and Panell1999 as cited in Herath and Wijekoon 2013).

Moreover, active farmer participation increased knowledge on integrated pest management (IPM) and those who attended trainings are better educated, own larger farms and have higher income. The farmers with these characteristics were also more aggressive in adopting innovative farming methods (Haug 1999; Dent 1995; Rogers 1995 as cited in Erbaugh et al. 2001). This is because high level of understanding is needed in the systematic management of organic products such as vegetables (Mondal et al. 2014) and in organic coconut (Baconguis and Cruz 2005 as cited in Herath and Wijekoon 2013).

What makes knowledge different from attitude?

Attitudes indicate more of the respondents' feelings towards two aspects: on OA and on its benefits and cost. Unlike knowledge that measures what is known, attitudes focus on the emotive aspects of what they know. The attitudes part of the survey includes 26 statements for attitudes on OA and 9 statements for attitudes on the benefits and cost of OA. The attitude of organic farmers on the two aspects of organic farming was assessed using 5-point scale of items with a perfect score of 130 points and 45 points. The sample size for each of the province varies as shown in Table 5.

Table 5 shows that all provinces have positive attitude score on the aspect of OA in general, more especially true for the provinces of Cebu, Davao, Iloilo and Negros Oriental. Similar to their attitudes on organic farming in general, these provinces also have positive attitudes on the cost and benefit of engaging in OA. The reason is because Davao farmers have registered positive attitude because they have been practicing IDOFS (Integrated Diversified OF System), intercropping (e.g. banana planted with coconut), and vermicast/vermicomposting even before the enactment of the organic agriculture law. Davao organic farmers see organic farming in relation to natural farming where the approach is holistic to enhance biodiversity for environmental protection, to achieve food security and to have a better income. Davao farmers produced their own bio spray but complained it to be a laborious and time consuming. Cebu

farmers, on the other hand, are practicing integrated farming where farm wastes are used as fertilizer. They are very much against the use of chemical fertilizers and are hands on in overseeing the entire farm operations.

Table 6 shows the statements where farmers mean attitude scores are generally positive. They registered more positive attitudes on the Cost and benefits aspect as compared to the aspect of organic agriculture in general. The positive attitude where there is high mean positive score on the health benefits of OF because of less pesticide, thus, safe to consume.

Table 6. Positive mean attitude score on selected statements farmers in the nine provinces.

Attitude statements	OA aspect	Mean scores
The increasing number of organic farmers in my community encourages pursuing OF	OA	4.38
OF values are agreeable to the values and beliefs of my farming community	OA	4.13
Converting to an OF system is exciting	OA	4.26
Converting to an OF system is challenging	OA	4.17
People living in rural areas prefer organic farm products than non-organic	OA	4.06
OF is effective in increasing the texture and fertility of soil	Cost and Benefits	4.44
OF can increase the income of farmers	Cost and Benefits	4.21
Farmers who are engaged in OF are highly regarded	Cost and Benefits	4.22
Organic products are safe to consume	Cost and Benefits	4.49
OF leads to an economically progressive nation	Cost and Benefits	4.19
All farmers should practice OF because it is a profitable endeavor compared to conventional farming	Cost and Benefits	4.22
Organic agriculture provides opportunity for farmers to produce diversified products	Cost and Benefits	4.2
The number of organic farmers will increase in the future due to popular demand	Cost and Benefits	4.15
There is a demand for organic agricultural products	Cost and Benefits	4.40
Consumers prefer organic agricultural products	Cost and Benefits	4.33
OF contributes to health improvement due to less use of pesticides and insecticides	Cost and Benefits	4.59

Relationship of socio-economic characteristics with knowledge and attitudes on organic farming

Socio-economic characteristics like age, educational attainment, farm size and attendance to trainings and seminars are hypothesized to affect knowledge level and formation of positive attitude. According to Herath and Wijekoon (2013) knowledge of organic farming, environmental aspects, age,

education and time spent on farming contributed significantly to attitude formation. For instance, Assis and Ismail’s study (2011) found farmers to be aware of the positive effects of engaging in organic farming, they also perceived that it entails costs and constraints that lead to unfavorable attitude towards organic farming. But in n another study by Herath and Wijekoon (2013), they found out that favorable attitudes towards the environment enhance organic cultivation. Further involvement of a third party such as the government, an NGO or a private company to assist organic growers would also increase the adoptability rate of organic farming.

Table 7 shows that knowledge of farmers on the benefits and cost on OA is related to their age ($r=0.113, p=.05$). Farmers who were better educated is positively related to their knowledge on both organic farming ($r=0.123, p=.05$) and the benefits of organic agriculture to the environment ($r=0.182, p=.01$). Thus, age and education contribute significantly to their knowledge on organic agriculture. However, farmers who sell their organic products contribute negatively to their knowledge on the environment, but positively on the knowledge of the cost and benefits of being an organic farmer. Therefore, a farmer, who sell his produce commercially, his knowledge on cost and benefit is also positively high. On the other hand, the relationship of attendance to organic agriculture orientation is negatively related to organic farming, which only goes to say that the orientation provided to organic farmers do not contribute significantly to their general knowledge on organic agriculture.

Table 7. Relationship between selected farmers’ characteristics and knowledge on organic agriculture, environment and cost and benefit of OA.

Characteristics	Knowledge on OA	Knowledge on Environment	Knowledge on BC
Age of Farmer (n= 325)	-.064	.007	.113*
Organic Farm Size (n=317)	.040	.046	.051
Year Started Organic Farming (n=307)	-.109	-.014	-.088
Highest Educational Completed (n=317)	.123*	.182**	-.068
Selling Organic Products (n=286)	.101	-.141*	.179**
Residential lot Status (n=325)	-.053	-.076	.026
Attended Orientation (Organic Farming) (n=224)	.044	-.243**	-.116
Attended Training (Vermicomposting)(n=224)	-.039	.073	-.086
Attended Training (Organic Fertilizer) (n=225)	.038	-.008	.059
Attended Training (Concoctions) (n=225)	.034	-.023	.062
Attended Farm Field School (FFS) (n=225)	.040	-.008	.067
Attended Training (Organic Crops Production) (n=225)	.034	-.083	-.015

** . Correlation is significant, * $p<=.05$; ** $p<=.01$

Pearson coefficient: Age of Farmer, Organic Farm Size, Year Started Organic Farming

Estimate (+ direct, - inverse) Interpretation: <0.2 very weak linear; 0.2-<0.4 weak linear; 0.4-<0.6 moderate linear, 0.6-<0.8 strong linear; 0.8-0.99 very strong linear; 1 perfect linear

Spearman Rank’s coefficient: Highest Education Completed

Estimate (+ direct, - inverse) Interpretation: <0.2 very weak; 0.2-<0.4 weak; 0.4-<0.6 moderate; 0.6-<0.8 strong; 0.8-0.99 very strong

ETA: Selling Organic Products, Residential lot Status, Attended Orientation (Organic Farming), Attended Training (Vermicomposting), Attended Training (Organic Fertilizer), Attended Training (Concoctions), Attended Farm Field School (FFS), Attended Training (Organic Crops Production)

Estimate Interpretation: <0.10 weak; 0.10-0.30 moderate; >0.30 strong

The mean attitude scores as related to their socioeconomic characteristics is also shown in Table 8. The organic farm size is negatively correlated to both their attitude on OA ($r=-0.277, p=.01$) and to the attitude of farmers on the benefits and cost of OA ($r=-0.225, p=.01$). This can be interpreted to mean that the larger the farm size may not contribute to both their attitudes on OA and cost and benefit of OA. The expectation is that the bigger the farm size, the more likely the farmer would have acquired positive attitude. This is not the case to the organic farmers in the survey. The selling of organic produce by farmers is negatively related to their attitude on benefits and cost. Farmers did not find it profitable thus a negative attitude. Attending orientation to OA, likewise was also found to be inversely related to their attitude but attendance to training on vermicomposting, almost a “must” to organic agriculture positively improves their attitude towards organic farming and their attitude towards cost and benefits related to organic farming with $r=-0.194, p=.01$; $r=0.181, p=.01$, respectively. After the training, farmers do agree that vermicomposting contributes to the commercial value of organic products.

Table 8. Relationship between selected Farmers’ characteristics and attitude on Organic agriculture, and Cost and Benefit of OA

Characteristics	Attitude on OA Score	Attitude on BC Score
Age of Farmer	-.045	-.029
Organic Farm Size	-.277**	-.225**
Year Started Organic Farming	-.002	-.052
Highest Education Completed	.022	.054
Selling Organic Products	-.038	-.160**
Residential lot Status	-.056	-.005
Attended Orientation (Organic Farming)	-.194**	-.135*
Attended Training (Vermicomposting)	.181**	.146*
Attended Training (Organic Fertilizer)	-.066	-.011
Attended Training (Concoctions)	-.085	-.024
Attended Farm Field School (FFS)	-.072	-.017
Attended Training (Organic Crops Production)	-.043	-.006

** . Correlation is significant, * $p<=.05$; ** $p<=.01$

Pearson coefficient: Age of Farmer, Organic Farm Size, Year Started Organic Farming

Estimate (+ direct, - inverse)

Interpretation: <0.2 very weak linear; 0.2-<0.4 weak linear; 0.4-<0.6 moderate linear, 0.6-

<0.8 strong linear; 0.8-0.99 very strong linear; 1 perfect linear

Spearman Rank’s coefficient: Highest Education Completed

Estimate (+ direct, - inverse)

Interpretation: <0.2 very weak; 0.2-<0.4 weak; 0.4-<0.6 moderate; 0.6-<0.8 strong; 0.8-

0.99 very strong

ETA: Selling Organic Products, Residential lot Status, Attended Orientation (Organic Farming), Attended Training

(Vermicomposting), Attended Training (Organic Fertilizer), Attended Training (Concoctions), Attended Farm Field School (FFS),

Attended Training (Organic Crops Production)

Estimate Interpretation: <0.10 weak; 0.10-0.30 moderate; >0.30 strong

Good knowledge about organic farming, positive perception towards environmental conservation and ability to spend more time on farming contributed to develop a favorable attitude towards organic

farming. In addition, older growers had a more favorable attitude towards organic farming. However, those with less education (fewer years of education) have developed a more favorable attitude towards organic farming. The reason was the well-educated organic growers are mainly interested in their profession rather than in farming (Herath and Wijekoon 2013). The present study showed that retired professionals opted to do organic farming as their second career.

Organic Farming Practices

With enough knowledge and positive attitude on OA, organic farmers are likely to continue practicing organic farming. The assumption is that knowledge and attitudes are predictive of one’s behavior. The various practices of the farmers in the different provinces were documented to determine the general practices of organic farmers based on the knowledge they gained from the different trainings and seminars. At the same time to know whether the information they have learned in various strategies in organic farming are translated into appropriate farming practices.

As shown in Table 9, the farming practices were used as follows: nature of labor used, fertilizer and pesticides used and other farming methods. Organic farmers in the provinces of Quezon, Iloilo, Negros Occidental, Negros Oriental, Cebu and Davao used family labor more than hired labor. Organic farmers from Bukidnon used almost equal family and hired labor. Almost all of the organic farmers in the eight provinces use compost except for the farmers in Bukidnon who use less compost and plant waste. But instead, fertilizers they use are mainly from animal manure and kitchen wastes. On the other hand, organic farmers in Camarines Sur use less in animal manure and kitchen waste relative to other farmers. Instead of chemical pesticides, organic farmers use trap methods, insect predators and biological control agents. Organic farmers use traps to monitor insect pest. Instead of using pesticides, organic farmers choose to promote the growth of natural insect predators in the farm. In addition, if there are no enough natural predators in the field, farmers release biological control agents like *Trichogramma* are released in the crop to control pest and increase natural insect predators. Farmers in Quezon mainly use trap methods while farmers from Negros Oriental use natural insect predators and biological control agents.

Table 9. Organic farming practices of the farmers in the 9 provinces, Philippines (in percent).

Organic Farming Practices	Tarlac (n=12)	Quezon (n=30)	Camarines Sur (n=33)	Iloilo (n=23)	Negros Occidental (n=50)	Negros Oriental (n=48)	Cebu (n=39)	Bukidnon (n=33)	Davao (n=58)
Nature of Labor Used									
Family Labor	66.7	93.3	69.7	73.9	86.0	88.9	92.3	87.5	84.5
Hired Labor	83.3	60	69.7	65.2	72.0	62.2	76.9	93.9	69.0
Fertilizers Used									
Composting	100.0	100	96.9	95.7	96.0	100.0	100	63.6	100.0
plant waste	91.7	96.7	96.8	95.7	100.0	93.8	97.4	57.6	98.3
green manure	75.0	96.7	90.3	95.7	74.0	95.6	94.9	69.7	94.7
animal manure	75.0	90	59.4	78.3	92.0	91.1	100.0	75.8	87.9
kitchen wastes	75.0	86.7	54.5	78.3	76.0	95.5	97.4	75.8	94.7
Pest Management									
trap methods	75.0	93.3	58.1	78.3	74.0	83.7	87.2	75.8	77.6
insect predators	66.7	80	53.3	52.2	70.0	86.0	76.9	75.8	71.9
biological control agents	75.0	43.3	67.9	56.5	70.0	97.8	79.5	78.8	86.0

Table 9 (Continued). Organic farming practices of the farmers in the 9 provinces, Philippines (in percent).

Organic Farming Practices	Tarlac (n=12)	Quezon (n=30)	Camarines Sur (n=33)	Iloilo (n=23)	Negros Occidental (n=50)	Negros Oriental (n=48)	Cebu (n=39)	Bukidnon (n=33)	Davao (n=58)
<i>Other Farming Methods</i>									
Planting cover crops	83.3	96.7	71	73.9	88.0	88.9	94.9	78.8	93.0
Using clean and clear water	75.0	96.7	78.1	95.7	91.8	100.0	73.7	66.7	93.1
Intercropping/mixed cropping	100.0	85.3	93.5	91.3	100.0	100.0	100	75.8	98.3
Pruning regularly	75.0	80	60	68.2	92.0	86.7	89.7	60.6	87.9
Mulching	66.7	76.7	46.4	100.0	94.0	86.0	87.2	78.8	91.2
Using organic quality seeds	91.7	70	90.6	78.3	90.0	97.8	94.9	69.7	98.3
Devoting more hours than the past	58.3	66.7	84.4	81.8	72.0	95.6	87.2	72.7	87.3

Farmers plant cover crops such as grasses and legumes to increase soil fertility and control insects in organic farms. In organic farming, the use of clean water in handling organic products ensures that these products are safe to consume. Intercropping involves planting different crops in the same cropping season to maximize the use of farm space and minimize pest problems. Pruning is the process of cutting branches or stems of crops cultivated to improve its growth and the cuttings are used as animal fodder. Mulching requires covering the soil with crop residues such as leaves or stalks to improve water retention. The use of organic seeds results in a healthy crop and high quality of the organic produce. In organic farming, farmers devote more time in monitoring the condition of their crops and livestock.

Farmers in Quezon, Cebu and Davao generally plant cover crops. All the farmers in Negros Oriental use clean and clear water for their organic produce. All farmers in Tarlac, Negros Occidental, Negros Oriental and Cebu plant different crops in their farms. The farmers in Negros Occidental practiced pruning regularly. All the Iloilo organic farmers practice mulching. Farmers in Negros Oriental generally used organic quality seeds and devote more hours in their farms.

CONCLUSIONS

Organic farming technology is perceived to be a solution to restore soil fertility to achieve food security in the long term. The 326 farmers who hail from the 9 provinces in the Philippines provided information on their characteristics, knowledge, attitudes and practices. The study has provided a profile of the organic farmers in each of the nine provinces. Median age range between 44 years old to 58 years old with farmers from Camarines Sur as the youngest median age and Tarlac farmers, having the highest median age. Generally, all farmers have less than 1 hectare. The average mean farm size is 1.71 with Tarlac farmers having big farm size. Knowledge of farmers was determined on the three aspects namely, organic farming, cost and benefit and environment. Attitude of the farmers was also determined on two aspects, namely organic farming and cost and benefit. The main assumption of the study (shown in the framework) is that positive attitude coupled with knowledge would lead to practice. To cite an example, are the farmers from Davao. They registered highest mean knowledge and attitude scores where more than 60 percent of the farmers are practicing organic farming technologies. The study also found that some characteristics are related to knowledge and attitude. Highly educated organic farmers are likely to be more knowledgeable on both organic farming in general and on the aspect of environment. Engaging in organic farming practice

is profitable since farmers who sell organic produce registered high knowledge mean scores on the cost and benefit aspects of OA. Attendance on trainings is the main source of knowledge. However, attending orientation on OA is not enough to contribute to their knowledge on the environment, in fact it is negatively related to attitude on OA and benefit and cost. Undeniably the contribution of trainings and seminars to knowledge of organic farming is supported in this study. The profile of organic farmers by province provide important inputs in the designing custom-made trainings and seminars. Need-based training programs for organic farmers means customizing the trainings according to the characteristics, attitudes, knowledge and practices to make it more appealing to the organic farmers who are still reluctant to convert to organic farming.

STATEMENT OF AUTHORSHIP

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