

Ohio Grain Farmers' Attitudes toward Organic and Non-Organic Farming Methods

Research Paper

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Abstract

American and international studies have compared the farming methods, attitudes, and demographic characteristics of non-organic and organic farmers. Other studies have revealed the barriers to using organic farming by non-organic farmers. This study was unique since researchers have not used the theory of planned behavior to describe the attitudes of organic and non-organic farming by non-organic Ohio corn and wheat growers. Additional components in this study were the barriers toward adopting organic farming and the relationship between demographic characteristics of Ohio grain farmers and their attitude formation. Data was collected through a questionnaire sent to 320 members of the Ohio Corn Growers Association or the Ohio Wheat Growers Association. Respondents reported a positive attitude toward using non-organic farming methods, while a more negative attitude toward using organic farming was reported. Ohio grain farmers in this study believed that organic farming would have more negative outcomes and identified barriers toward adoption. The researcher suggested that Extension professionals could use the findings about Ohio grain farmers' attitudes toward organic farming and their barriers toward adoption to help farmers understand agricultural innovations. Commodity organizations could use the same findings for determining ways to overcome barriers to adopting farming practices and design communication tools to educate farmers. Recommendations were made for further research and curriculum development by agricultural communication faculty.

Keywords: organic farming, non-organic farming, attitude, theory of planned behavior, grain farmers, adoption barriers, survey research

Introduction

The increased demand for organically grown food has reflected consumers' concern with food safety, genetically modified foods, pesticide residues, and the environmental impact of conventional agriculture (Fresh Trends, 1996; La Trobe, 2001; Misra, Huang, & Ott, 1991; Zepeda, Chang, & Leviten-Reid, 2006). This change in food purchases has encouraged the expansion of organic foods at farmers markets, natural product supermarkets, conventional supermarkets, and club stores (Dimitri & Greene, 2002).

The U.S. organic food business has reported \$13.8 billion in consumer sales in 2005, roughly 2.5% of the total U.S. food sales (Organic Trade Association, 2006). While the organic agriculture industry has experienced a 20% increase in demand for raw materials each year, farmers' supply of organic raw materials, especially organic soybeans and grains, increases roughly 1% annually (Villagran, 2008). Given the supply and demand for organic foods, it would be valuable to communicators, educators, and Extension professionals to understand non-organic farmers' attitudes toward organic and non-organic agriculture and their barriers to adoption.

Barriers toward Adopting Organic Farming

Previous studies have revealed possible economic, health, and technical barriers that influenced non-organic farmers' attitudes about adopting organic farming practices (Hattam, 2006; Schneeberger, Darnhofer, & Eder, 2002). Such studies explained why non-organic farmers did not consider organic production as economically feasible (Darnhofer, Schneeberger, & Freyer, 2005; Fairweather, 1999; Niemeyer & Lombard, 2003). Austrian farmers, for example, did not adopt organic practices for the following reasons: no compensation payments for organics and no willingness to forego net income for benefits of environmentally friendly farming (Darnhofer et al., 2005). The loss of return on organic products would have affected

British farmers' ability to pay their mortgages (Fairweather, 1999). Large-scale, non-organic farmers in South Africa considered fewer marketing opportunities, no premium prices, and the lack of subsidies as economic factors keeping them from adopting organic practices (Niemeyer & Lombard, 2003).

Research has shown that chemical use is a health related barrier toward adopting organic farming. In New Zealand, 54 out of 62 farmers were not interested in organic farming because they were not concerned with chemicals in food (Fairweather, 1999). Another health barrier was that neither farmers nor their family members have personally experienced illness from the use of such chemicals (Fairweather, 1999).

Research has shown that technical feasibility was another factor farmers consider when forming their attitudes toward organic farming. According to Schneeberger et al. (2002), Austrian cash-crop producers hesitated to adopt organic production due to problems with weeds, diseases and insects, and additional labor requirements. In a study done in South Africa, large-scale non-organic farmers listed yield reductions, higher weed and pest infestations, and more disease damage on crops as problems associated with the conversion process (Niemeyer & Lombard, 2003). One technical problem for non-organic farmers in New York was their preference of pest and disease resistant crop varieties as compared to natural seeds (Buttel & Gillespie, 1988). Farmers expressed their anxiety about crop diseases when farming organically because they considered the information about organic farming insufficient (Padel & Lampkin, 1994).

Demographic Characteristics of Organic and Non-Organic Farmers

Studies have analyzed various demographic characteristics to determine how they relate to attitudes toward organic farming methods. The most frequently studied characteristics were

years of farming experience, family farming tradition, age, education level, and gender (Duram, 1999; Egri, 1999; Fairweather, Campbell, Tomlinson, & Cook, 2001; Midmore et al., 2001; McCann, Sullivan, Erickson, & De Young, 1997; Niemeyer & Lombard, 2003). Studies in Canada and New Zealand have revealed that non-organic farmers have more years of farming experience than organic farmers. Egri (1999) reported that Canadian non-organic farmers have been farming on an average of 22 years compared to 17 years by organic farmers. Similarly, New Zealand non-organic farmers had roughly 38 years of experience, while organic farmers had 34 (Fairweather et al., 2001).

Research suggested that differences exist in family tradition of farming between non-organic and organic farmers. Michigan non-organic farmers tended to be from a family that was involved directly with agriculture, while only 3 out of 12 organic farmers came from similar backgrounds (Naemi, 1996). Most Michigan organic farmers were fairly new to the agricultural profession. Only 44% of 26 organic farmers in Colorado were raised on farms, all of which were conventional farms (Duram, 1999).

The age difference between organic and non-organic farmers was explored in a few studies as well. Niemeyer and Lombard (2003) reported that South African organic farmers were younger than the non-organic, commercial farmers. The largest age group for non-organic farmers (n=118) was more than 41 years old. Michigan organic and non-organic farmers had a mean age of 46 and 50, respectively (McCann et al., 1997).

Studies have explored the level of education obtained by non-organic and organic farmers (Duram, 1999; Fairweather et al., 2001; McCann et al., 1997). Of 23 organic farmers in Colorado, only 8% did not finish high school, 4% were high school graduates, 22% had some college, and 52% were college graduates (Duram, 1999). A small percentage (9%) of organic

farmers in Colorado earned an agricultural degree while in college, while the remaining participants studied history, literature, biology, theology, or another discipline. This data about educational major suggests that alternative views of agriculture exist between farmers with agriculture degrees and non-agricultural degrees. In one study conducted by Fairweather et al. (2001), results showed that all New Zealand organic and non-organic farmers had a high school education, while roughly 38% of organic and 37% of non-organic farmers had completed some form of higher education (trade certificate or diploma, bachelor's degree, or postgraduate studies). McCann et al. (1997) reported that the typical Michigan organic or non-organic farmer had some college education, but not a degree.

Numerous studies have documented the gender differences between organic and non-organic farmers. Davidson and Freudenburg (1996) and Filson (1993) found that female farmers had higher levels of concern for the environment, especially in respect to specific environmental issues. According to Beus and Dunlap (1994), women farmers in Washington state were more likely to use alternative or organic farming practices.

Theoretical Framework

This study is guided by the theory of planned behavior, which is a widely accepted way to study human behavior. Researchers have applied the theory of planned behavior in studies related to interpersonal communication, health communication campaigns, advertising, and marketing. Ajzen (1991) developed the theory of planned behavior (TPB) as a means to comprehend and predict individuals' behaviors in which humans do not have complete control. Attitude is a direct measure of the theory of planned behavior (Francis et al., 2004). Attitude toward a behavior pertains to an individual's favorable or unfavorable judgment of completing a behavior. Two factors indirectly influence an individual's attitude toward a behavior: a belief

that a certain behavior would lead to an outcome and the evaluation of that outcome. Behavioral beliefs, another component of TPB, are the likely probability that a behavior would lead to the expected outcome (Hrubes, Ajzen, & Daigle, 2001). An individual who believes that acting out a certain behavior would result in a positive outcome would have a favorable attitude toward acting out the behavior. However, an individual who believes that acting out a certain behavior would result in a negative outcome would retain a negative attitude toward completing the behavior.

Attitude

Eagly and Chaiken (1993) defined attitude as a tendency revealed through varying degrees of favorable or non-favorable judgments. Attitudes are expressed in three categories – cognitive, affective, and behavioral (Eagly & Chaiken, 1993). The cognitive category includes all ideas that individuals hold about attitude objects (Eagly & Chaiken, 1993). The behavioral category involves individuals' actions regarding attitude objects (Eagly & Chaiken, 1993). Researchers could expect that individuals' attitudes positively relate to their apparent behavior (Eagly & Chaiken, 1993). This concept of attitude in the behavioral category relates to the theory of planned behavior because Azjen and Fishbein (1980) noted that individuals have favorable attitudes toward behaviors when they think the behavior leads to a positive outcome.

Purpose & Research Objectives

The purpose of this study was to explore Ohio grain farmers' attitudes toward organic and non-organic farming by applying constructs from the theory of planned behavior. This study determined whether demographic characteristics related to their attitudes toward organic and non-organic farming. Knowing non-organic farmers' attitudes toward organic and non-organic agriculture and their barriers to adoption would help communicators, educators, and Extension

professionals who develop communication tools and programming that promotes organic farming. Specific research objectives guiding this study were:

1. To describe Ohio grain farmers' attitudes toward using non-organic and organic farming practices on their farms
2. To explain the demographic characteristics, which are related to Ohio grain farmers' attitudes toward organic and non-organic farming.

Methods

This study randomly sampled 320 farmers who were members of the Ohio Corn Growers Association (OCGA) or the Ohio Wheat Growers Association (OWGA). The OCGA and OWGA are member-based, non-profit trade organizations that provide education and support to farmers, industry representatives, and legislators to increase marketing and profit in their industries (Ohio Corn Growers Association, 2007; Ohio Wheat Growers Association, n.d). Ohio was ranked 8th in corn production for grain and 9th in winter wheat production in the United States in 2005 (Ohio Office of U.S. Department of Agriculture's National Agricultural Statistics Service, 2005). Similarly, Ohio was ranked 6th and 16th for the amount of acreage in certified organic corn and wheat, respectively in 2005 (Greene, 2006).

A researcher-developed questionnaire consisting of 29 items was adapted from previous studies (Egri, 1999; Fairweather et al., 2001; Midmore et al., 2001; Niemeyer and Lombard, 2003; Schneeberger et al., 2002). A 7-point Likert-type scale constituting of ten items measured attitude toward organic farming methods and attitude toward non-organic farming methods (Ajzen, 2002). Six outcome evaluation statements measured respondents' positive or negative opinions about farmers' behavioral beliefs for organic farming (Ajzen & Fishbein, 1980; Francis et al., 2004). The questionnaire asked participants what barriers influenced their decision to not

adopt organic farming practices. This study compared Ohio grain farmers' attitude toward organic and non-organic farming with their demographic characteristics: gender (Beus & Dunlap, 1994; Egri, 1999), family farming history, age (Fairweather et al., 2001; McCann et al., 1997; Niemeyer & Lombard, 2003), education (Duram, 1999; Fairweather et al., 2001; McCann et al., 1997), political party affiliation, and gross farm sales.

After a panel of experts reviewed the questionnaire items to establish validity, the questionnaire was pilot tested by each association's board members. The five items measuring attitude toward non-organic farming had a Cronbach's alpha of .859. For the five items in the attitude toward organic farming scale, a Cronbach's alpha of .856 was calculated. Six items in the outcome evaluations scale had a Cronbach's alpha of .86.

The researcher implemented survey procedures as described by Dillman's Tailored Design Method (Dillman, 2007). Recipients received a pre-notice letter, a packet, and a thank you/reminder postcard. A revised letter, replacement questionnaire, and a stamped, self-addressed envelope was sent to non-responders. A total of 243 surveys out of 320 were returned for a response rate of 76%. According to Ary, Jacobs, Razavieh, and Sorensen (2006), a researcher who has a response rate between 75 to 90% may stop collecting data. The researcher handled non-response to the survey by comparing early to late respondents (Ary et al., 2006). No significant differences were found.

Findings

All respondents indicated that they farmed using conventional methods. The majority of respondents (n=156, 76.1%) indicated that they have never even considered organic production on their farms, while 42 respondents (20.5%) have considered organic production and did not adopt. Only 45 respondents (22%) have purchased organic food within the last two years, while

160 respondents (78%) have not purchased it.

The respondents were unevenly distributed by gender, with 98.5% (n=202) male and 1.5% (n=3) female. Respondents' age was also unevenly distributed with a slight majority, 28.9% (n=59), older than 62 years, followed by 24% (n=49) ranging in age from 52-56, 16.2% (n=33) ranging from 47-51, and 12.3% (n=25) ranging from 57-61. Eighteen (8.8%) respondents ranged in age from 42-46, and 10 respondents (4.9%) ranged in age from 37-41. Only 4.9% (n=10) reported being younger than 36.

The majority, 55.9% (n=114), earned a high school education, followed by 26.5% (n=54) with a bachelor's degree, 11.8% (n=24) with an associate's degree, and 5.4% (n=11) with a master's degree. Only one individual obtained less than a high school education. The majority of bachelor's degree or graduate degree programs were in agricultural business and economics, agricultural education, agronomy, animal science, dairy science, or agricultural production.

Most respondents (67.2%, n=133) affiliated themselves with the republican political party, while 8.6% (n=17) identified themselves with the independent political party, and 7.1% (n=14) identified themselves as democratic. Thirty-four respondents (17.2%) preferred to not identify with a political party.

Farming was the main occupation for 170 of the respondents (82.9%), while 35 respondents (17.1%) held other occupations off the farm. Roughly, 89% (n=183) of the respondents had at least one of their parents who farmed.

The majority of respondents (n=68, 36.6%) earned gross farm sales of \$500,000 or greater in the last year, while the next group (n=53, 28.5%) earned between \$100,000-\$249,999. Forty-four respondents (23.7%) earned between \$250,000-\$499,999 gross farm sales, and 14

respondents (7.5%) earned between \$40,000-\$99,999. Only seven respondents (3.8%) earned less than \$39,999 gross farm sales.

Objective 1: To Describe Ohio Grain Farmers' Attitudes toward Using Non-Organic and Organic Farming Practices on Their Farms

Attitude toward using non-organic farming practices was directly measured with five items using a 7-point attitudinal scale. A high overall mean (5-7) represents a positive attitude, and a low overall mean (1-3) represents a negative attitude. Results indicated that Ohio grain farmers had an overall mean of 5.20 (n=196, SD=1.52) for the direct measure of attitude toward non-organic farming practices (see Table 1). The mean was also provided for each individual item in the scale. Ohio grain farmers held a slightly good attitude (M=5.61, n=180, SD=1.43), a slightly favorable attitude (M=5.49, n=191, SD=1.74), and a slightly useful attitude (M=5.43, n=184, SD=1.68) toward using non-organic farming practices on their farms. Ohio grain farmers viewed non-organic farming practices as neither reliable nor unreliable (M=4.91, n=184, SD=1.98) and neither pleasant nor unpleasant (M=4.85, n=180, SD=1.89).

The same scale was used to measure attitude toward using organic farming practices. The overall mean of Ohio grain farmers' attitude toward using organic farming practices was 2.95 (n=194, SD=1.23). The mean was also calculated for each item in the scale. Ohio grain farmers felt organic farming practices were unreliable (M=2.99, n=181, SD=1.67), useless (M=2.96, n=179, SD=1.40), and unfavorable (M=2.56, n=191, SD=1.37) on their farms. Ohio grain farmers felt slightly that organic farming practices were unpleasant (M=3.39, n=180, SD=1.63) and bad (M=3.13, n=178, SD=1.43).

Table 1
Items Measuring Attitude toward Using Non-Organic and Organic Farming Practices

	Organic Farming			Non-Organic Farming		
	n	M	SD	n	M	SD
Reliable	181	2.99	1.67	180	5.61	1.43
Useful	179	2.96	1.40	191	5.49	1.74
Favorable	191	2.56	1.37	184	5.43	1.68
Pleasant	180	3.39	1.63	184	4.91	1.98
Good	178	3.13	1.43	180	4.85	1.89
Overall Mean	194	2.95	1.23	196	5.20	1.52

Outcome evaluations, a component of behavioral beliefs, were measured on a 7-point Likert-type scale ranging from extremely bad to extremely good. The overall mean for outcome evaluations was 2.72 (SD = 1.15), indicating an unfavorable evaluation of organic farming. The mean is reported for each individual item on the outcome evaluations scale. As seen in Table 2, the elimination of synthetic chemicals by farming organically was viewed as slightly bad (M=3.80, SD=1.76) by the respondents. They also had the opinion that increasing production costs because of organic farming was slightly bad (M=3.05, SD=1.29). Ohio grain farmers thought organic farming was bad if it would increase their workload (M=2.57, SD=1.34), result in higher weed infestations (M=2.15, SD=1.53), increase pests and diseases (M=2.33, SD=1.49), and reduce yields (M=2.42, SD=1.48).

Table 2
Items for Measuring Outcome Evaluations of Adopting Organic Farming

Outcome Evaluation	n	M	SD
Eliminating the use of synthetic chemicals by farming organically is:	197	3.80	1.76
Increasing production costs because of organic farming is:	194	3.05	1.29
Increasing my workload from farming organically is:	198	2.57	1.34
Encountering reduced yields from farming organically is:	186	2.42	1.48
Encountering more pests and diseases from farming organically is:	198	2.33	1.49
Receiving higher weed infestations from farming organically is:	196	2.15	1.53
Overall Mean	198	2.72	1.15

Scores based on Likert-type scale with 1 = extremely bad and 7 = extremely good.

Ohio grain farmers indicated barriers toward growing organic crops, which could explain their attitude toward using organic farming methods on their farms. As seen in Table 3, the expectation of higher weed infestations was the most frequently mentioned barrier (n=171, 71.0%). The second most frequently mentioned barrier was the expectation of lower yields (n=162, 67.2%), followed by higher pest infestation (n=136, 56.4%), and too much additional work (n=124, 51.5%). Roughly, 46% of the Ohio grain farmers (n=111) considered organic farming to not be economically viable. The expectation of more disease was a concern for 42.3% (n=102) of the respondents, and 40 respondents (16.6%) thought the lack of information about organic farming practices was a barrier toward adoption. Twenty-eight respondents (11.6%) mentioned “other” barriers including market availability, shortage of organic fertilizer, concern for bugs and weeds, lack of organic standards, and the lack of a uniform definition of organic. Others mentioned that organic farming increased soil erosion, run-off, and water quality problems because it reduced the option of no-till or minimum till farming.

Table 3
Barriers toward Growing Organic Crops

Barrier	n	%
Higher Weed Infestation	171	71.0
Lower Yields	162	67.2
Higher Pest Infestation	136	56.4
Too Much Additional Work	124	51.5
Not Economically Viable	111	46.1
More Disease	102	42.3
Lack of Information	40	16.6
Not Technically Feasible	38	15.8
Organic Seed Harder to Obtain	36	14.9
Organic Certification Is Too High	29	12.0
Other	28	11.6

Objective 2: To Explain the Demographic Characteristics, which are Related to Ohio Grain Farmers' Attitudes toward Organic and Non-Organic Farming

Crosstabs showed the frequency of responses among the direct measure of attitude and the demographic characteristic of level of education and political party affiliation (Ary et al., 2006). No chi square test for significance could be run due to cell sizes less than five (Ary et al., 2006).

The majority of respondents from different levels of education (n=147) had a negative attitude toward organic farming (see Table 4). There were 40 respondents from the different levels of education who indicated a neutral attitude toward organic farming.

Table 4
Level of Education Related to Attitude toward Organic Farming

Attitude toward Organic Farming	What is your highest level of education?				Total
	High School	Associate's	Bachelor's	Master's	
Extremely Negative	25	3	11	5	44
Quite Negative	23	4	10	1	38
Slightly Negative	34	11	18	2	65
Neutral	23	3	11	3	40
Slight Positive	3	0	1	0	4
Quite Positive	1	0	0	0	1
Extremely Positive	0	1	0	0	1
Total	109	22	51	11	193

Despite the different levels of education, the majority of respondents held a positive attitude toward non-organic farming (n=117) (see Table 5). Forty-nine respondents reported a neutral attitude toward non-organic farming. A negative attitude toward non-organic farming was indicated by 29 respondents.

Table 5
Level of Education Related to Attitude toward Non-Organic Farming

Attitude toward Non-Organic Farming	What is your highest level of education?				Total
	High School	Associate's	Bachelor's	Master's	
Extremely Negative	5	0	0	2	7
Quite Negative	3	2	3	0	8
Slightly Negative	11	2	1	0	14
Neutral	28	8	13	0	49
Slight Positive	14	5	14	4	37
Quite Positive	27	4	9	4	44
Extremely Positive	22	2	11	1	36
Total	110	23	51	11	195

As seen in Table 6, the majority of respondents who affiliated with the republican political party (n=95) held a more negative attitude toward organic farming. There were 27 respondents affiliated with the republication party who reported a neutral attitude toward organic farming. Sixteen independent and 10 democratic affiliated respondents also held negative attitudes toward organic farming.

Table 6
Political Party Affiliation Related to Attitude toward Organic Farming

Attitude toward Organic Farming	With which political party do you identify?				Total
	Democratic	Independent	Republican	Prefer to not Respond	
Extremely Negative	2	7	31	5	45
Quite Negative	2	5	24	4	35
Slightly Negative	6	4	40	13	63
Neutral	3	1	27	8	39
Slight Positive	0	0	2	1	3
Quite Positive	0	0	1	0	1
Extremely Positive	0	0	0	1	1
Total	13	17	125	32	187

The republican political party had the most respondents (n=73) who indicated a positive attitude toward non-organic farming practices (see Table 7). Seven out of 13 democratic affiliated respondents and 11 out of 17 independent affiliated respondents also reported a

positive attitude toward non-organic farming. Despite the different political party affiliations, 48 respondents held a neutral attitude toward non-organic farming.

Table 7
Political Party Affiliation Related to Attitude toward Non-Organic Farming

Attitude toward Non-Organic Farming	With which political party do you identify?				Total
	Democratic	Independent	Republican	Prefer to not Respond	
Extremely Negative	0	1	5	2	8
Quite Negative	1	1	5	1	8
Slightly Negative	2	0	10	2	14
Neutral	3	4	33	8	48
Slight Positive	2	2	22	7	33
Quite Positive	4	5	27	6	42
Extremely Positive	1	4	24	7	36
Total	13	17	126	33	189

Spearman’s rho was calculated to look for a relationship between demographic characteristics of age and gross farm sales and attitude. Age ($r=-.092$) and gross farm sales ($r=-.032$) had low, negative correlations with the respondents’ attitude toward organic farming. As the age or gross farm sales increase, the attitude toward organic farming would become more negative.

The researcher used Spearman’s rho to report that age ($r=-.216$) has a low, negative correlation with attitude toward non-organic farming. The correlation was significant at the .01 level. Spearman’s rho showed that gross farm sales ($r=-.015$) had a negligible, negative correlation with respondents’ attitude toward non-organic farming.

Conclusions

Objective 1: To Describe Ohio Grain Farmers’ Attitudes toward Using Non-Organic and Organic Farming Practices on Their Farms

An overall mean of 5.20 ($n=196$) indicated that Ohio grain farmers have a positive attitude toward using non-organic farming practices. This was not surprising since the Ohio grain

farmers mentioned numerous barriers toward growing crops organically, and they are farming in a traditional Midwestern state known for its corn, soybeans, and wheat. Similar to Austrian non-organic farmers (Darnhofer et al., 2005), Ohio grain farmers were not willing to use organic farming methods since there was a lack of organic farming standards. Ohio grain farmers also had the same views toward organic farming as Austrian cash-crop producers who were hesitant to grow crops organically due to expected problems with weeds, diseases, pests, and additional work. Niemeyer and Lombard (2003) revealed the risks and problems associated with organic farming by large-scale conventional farmers in South Africa. Both South African and Ohio farmers listed yield reductions, higher weed, pest, and disease infestations, and marketing opportunities as barriers toward organic farming. Since these barriers may be controlled more easily by non-organic farming practices, it could explain why Ohio farmers in this study have a more favorable attitude toward non-organic farming.

This study also indicated Ohio grain farmers' attitude toward using organic farming practices. Overall, Ohio grain farmers held a negative attitude toward using organic farming practices on their farms ($M=2.95$). This finding was not surprising since no participants in the study were organic farmers. Only 42 respondents (20.5%) have ever considered organic production on their farms, but all have decided not to convert at this point. It is also important to note that a majority of respondents (78%) do not purchase organic food. Findings indicated that respondents think using organic farming would lead to negative outcomes ($M=3.35$). Negative outcomes from farming organically included the elimination of synthetic chemicals, and an increase in production costs, workload, pests and diseases. Respondents also reported that converting to organic farming practices would result in a negative outcome if they had higher weed infestations and reduced yields.

The list of barriers toward growing crops organically confirmed that Ohio grain farmers hold a negative attitude toward organic farming. The barriers to adopting organic farming were reduced yields, increased workload, more pest and disease problems, and higher weed infestations. As stated earlier, many of these barriers such as reduced yields, pest and disease problems, and higher weed infestations may indicate that farmers feel organic methods would cause them to have problems with managing their fields. This negative image of organic farming may negatively affect Ohio grain farmers' attitude toward organic farming. The Ohio Corn Growers Association has concentrated its legislative efforts and major initiatives on corn-based ethanol production and the farm bill (Ohio Corn Growers Association, 2007). It could be assumed that if a majority of members in the Ohio Corn Growers Association is producing corn for ethanol production then the majority would be less interested in adopting organic farming practices because organic corn is not needed for this product. Similarly, the initiatives for the Ohio Wheat Growers Association have focused on improving wheat production and breeding. Since these trade associations have initiatives that do not address organic farming, respondents may have little pressure to farm organically.

Objective 2: To Explain the Demographic Characteristics, which are Related to Ohio Grain Farmers' Attitudes toward Organic and Non-Organic Farming

This study explored the demographic characteristics of Ohio non-organic grain farmers in relationship to their attitudes toward organic and non-organic farming. The majority of farmers (n=59, 28.9%) were 62 or older, followed by respondents who were between the ages of 52-56 (n=49, 24%). The average age of U.S. farm operators in 2002 was 55.3 years, which is similar to farmers in this study (National Agricultural Statistics Service, 2004). However, the Ohio grain farmers in this study were older than non-organic farmers in Michigan and South Africa. South African conventional, large-scale farmers were older than 41 (Niemeyer & Lombard, 2003), and

Michigan non-organic farmers had a mean age of 50 (McCann et al., 1997). These Ohio grain farmers may have little interest in adopting organic farming practices since they are older and may be focusing on saving for retirement. Alternatively, it could be argued that these Ohio grain farmers have been using non-organic practices for a long period of time and may not want to change their farming style.

Studies about organic and non-organic farmers in Colorado, New Zealand, and Michigan have documented differences in education level. Regarding college education, Colorado organic farmers were unlikely to study agriculture production; only 9% of these organic farmers earned an agriculture degree (Duram, 1999). The remaining organic farmers in Colorado studied liberal art disciplines, such as biology, literature, or history. The majority of Ohio grain farmers in this study who earned a bachelor's degree or graduate degree indicated they studied agricultural business and economics, agricultural education, agronomy, animal science, dairy science, or agricultural production. This difference in college majors may explain the difference in attitude toward organic farming between organic and non-organic farmers. However, it is important to note that the majority of Ohio grain farmers in this study (n=114, 55.9%) indicated high school as their highest level of education. Perhaps the respondents with a high school education were not exposed to organic farming practices in their general curriculum or vocational agriculture opportunities. Similarly, more New Zealand and Michigan non-organic farmers had obtained a high school education than college education (Fairweather et al., 2001; McCann et al., 1997).

Previous studies have indicated a difference in the history of family farming between non-organic and organic farmers (Duram, 1999; McCann et al., 1997). Unlike non-organic farmers in Michigan and Colorado, organic farmers frequently did not come from traditional farming families. Similar to these non-organic farmers, the majority of Ohio non-organic grain

farmers were from traditional farming families. It is possible that Ohio grain farmers from families that grew traditional crops would also grow non-organic crops since they have the knowledge and experience to continue.

Differences in gender between organic and non-organic farmers may also explain attitude toward using organic farming in this study. Studies have found that women had a higher concern for the environment and are more likely to use alternative or organic farming practices (Beus & Dunlap, 1994; Davidson & Freudenburg, 1996; Egri, 1999; Filson, 1993). While women indicated a more favorable attitude toward environmental practices and organic farming, this study of Ohio grain farmers only had 3 female participants. The majority of respondents (n=202, 98.5%) were male. The higher rate of males responding to the study could also attribute to the negative attitude toward using organic farming in Ohio found through this study.

Gender was not the only demographic characteristic that could explain attitude toward organic farming. Research between Michigan organic and non-organic farmers suggested differences in attitude exists based on whether a family member was involved in farming or not (McCann et al., 1997). Non-organic farmers in Michigan frequently came from a family that was involved in traditional agriculture practices. Similar to Michigan farmers, 89% of Ohio grain farmers had at least one of their parents who farm. Due to this, Ohio grain farmers may have used only non-organic farming practices while growing up and would continue these practices when farming as adults.

In this study, the majority of respondents affiliated with the republican political party also reported a negative attitude toward organic farming. With roughly 55% of the respondents (n=133) aligned with the republican political party, it could be argued that these republican grain farmers may hold conservative views and would not consider adopting organic farming.

Gross farm sales could also be a factor Ohio grain farmers consider when forming their attitude toward non-organic farming practices. Gross farm sales were over \$500,000 for 68 respondents (36.6%), while 53 respondents (28.5%) reported gross farm sales of \$100,000 to \$249,000, and 44 respondents (23.7%) earned between \$250,000-\$499,999. If Ohio grain farmers are satisfied with gross farm sales earned from non-organic production, they may have a favorable attitude toward non-organic farming practices.

Recommendations

The research suggests that Ohio grain farmers consider technical and economic concerns as barriers toward using organic farming practices. It is recommended that further research be conducted regarding the social and moral reasons for why farmers may or may not adopt organic farming, and what can be done to overcome identified barriers to adoption. Additionally, further exploration of organic farmers in Ohio may reveal other barriers that have had to be overcome. Researchers could further explain whether Ohio grain farmers' attitudes toward organic farming and the barriers to adopt influence learning and retention of new organic farming information.

Subjective norms, one component of the theory of planned behavior, apply pressure on individuals to perform a certain behavior. Further research might address subjective norms by focusing on the individuals who would influence farmers to adopt organic farming. Additional research should be conducted to describe the communication channels farmers would use when considering the adoption of a farming practice such as organic farming. The theory of planned behavior also has perceived behavioral control as one component. Perceived behavioral control relates to the ease or difficulty in performing a behavior. Further research could identify the resources, information, or opportunities that farmers need to have confidence in performing a behavior such as farming organically. Other studies could explore farmers' self-efficacy to adopt

a farming practice like organic farming.

This study found that certain demographic characteristics of Ohio non-organic grain farmers might influence their attitude toward organic farming. Researchers could investigate Ohio organic farmers who grow corn and wheat to uncover their attitude toward non-organic farming, attitude toward organic farming, and their demographic characteristics. This new information would allow researchers to compare the results of Ohio non-organic and organic farmers. Other commodity organizations should be studied to see if these findings about attitude toward organic and non-organic farming are specific to these traditional crop farmers.

Findings in this study may have implications on the curriculum agricultural communication faculty would teach. Agricultural communication faculty could teach students how to write persuasive messages or design campaigns that influence farmers' attitudes toward adopting a farming practice such as organic farming. Knowing the barriers to adopting a farming practice would help students tailor the messages. Extension professionals would also benefit from knowing farmers' attitudes and barriers to adopting organic farming when presenting new farming techniques. Commodity professionals could use the data about barriers to adopting organic farming to improve the farming technique. A campaign could focus on changing the attitudes toward organic farming and deliver messages about ways to overcome the barriers.

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