

## Public Opinions of Farmer-Oriented Environmentally Friendly Extension Programs: A Case of Best Management Practices

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*Public concern about environmental protection has been developing for decades. However, a knowledge gap exists between farmers and consumers regarding the implementation of environmental protection practices through the use of Best Management Practices (BMPs). Extension can bridge this knowledge gap by developing effective educational programs about BMP use. This study sought to identify consumers' perceptions of BMPs and preferred communication channels to facilitate the development of farmer-oriented Extension programs which assist with direct communication between farmers and consumers. Residents in seven Florida counties (N = 700) were surveyed for this descriptive study. Respondents were asked about their perceptions, beliefs, trust, and attitudes related to BMPs, as well as preferred communication channels for farming practices. The findings indicated the respondents either agreed or were undecided if farmers practice BMPs properly, and the majority perceived farmers' engagement in BMPs as important. Over 60% of the respondents believed farmers practicing BMPs care about the environment and would trust and purchase products from BMP-practicing farmers. The respondents indicated their preferred information sources were mass media and communicating directly with farmers at farmers' markets and local festivals. Therefore, Extension educators should develop educational programs for farmers emphasizing the need to communicate with consumers using consumers' preferred channels.*

*Keywords:* Extension education, environment stewardship, fertilizer application, consumer trust, communication channels

### Introduction

The general public has been developing environmental concerns since the 1960s, with concerns about environmental quality and protection growing over time, reaching a peak in the early 1990s (Dunlap, 1991; Schultz, 2001; Wray-Lake, Flanagan, & Osgood, 2010). The importance of agriculture has been acknowledged by the public in providing economic, social, and environmental benefits, such as rural environmental public good, cultural heritage, biodiversity,

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and environmental quality (Hall, McVittie, & Moran, 2004; Salazar-Ordóñez, Rodríguez-Entrena, & Sayadi, 2013). Since food is the primary connection between consumers and agriculture, consumers' concerns about environmental issues has been reflected in their perceptions of agriculture and food purchasing behaviors (Steenkamp, 1997; Yiridoe, Bonti-Ankomah, & Martin, 2005). In order to ensure the sustainability of the environment while enhancing agricultural production, educational programs related to environmental stewardship have been developed by Extension to educate farmers on how to manage their production practices by using more environmentally-friendly practices (Allen, Van Dusen, Lundy, & Gliessman, 1991). By educating farmers about approaches that align with public perception of environmental stewardship, they may be better able to connect with consumers. As such, Extension may improve farmers' businesses by increasing their sales to consumers who appreciate the value of adopting environmentally conscious practices (Abel, Thomson, & Marezki, 1999).

Best Management Practices (BMPs) are specific approaches that, when followed, have been found to assist in reducing pollution of water resources and maintaining, or even improving, water quality and agricultural production (U.S. Environmental Protection Agency [USEPA], 2013). Programs related to BMPs have been widely developed to improve environmental and agricultural sustainability (USEPA, 2003). A wide range of BMPs have been applied by farmers in the form of farm management, including chemical use control (i.e., pesticides, fertilizers), waste management, water management, soil management, and agroecosystem conservation (USEPA, 2010; Young, 2011). While perception gaps, which can influence farmers' willingness to adopt BMPs, have been found between farmers and the government regarding the need for environmental management (Smith, Peterson, & Leatherman, 2007), farmers who are aware of environmental issues and have positive attitudes toward the environment are more likely to adopt BMPs (Baumgart-Getz, Prokopy, & Floress, 2012).

Farmers' adoption of sustainable practices may also be affected by consumer value (Hall, Dennis, Lopez, & Marshall, 2009) with environmental protection practices used as a marketing strategy to support agricultural businesses (Warner, 2007). Moon, Florkowski, Brückner, and Schonhof (2002) examined consumers' willingness to pay extra for foods labeled as having been produced using environmentally-friendly production techniques. Their findings indicated consumers were willing to pay a premium price for food labeled as eco-friendly, and educational programs were recommended to enhance consumers' awareness of environmental issues related to agricultural production (Moon et al., 2002). Similarly, the respondents of Hawkins, Burnett, and Stack's (2012) study indicated consumers were more willing to purchase vegetables and ornamental plants produced from organic, sustainable, and local farms despite higher prices.

The concept of reflexive modernization (Beck, 1992) has been used to describe the phenomenon of sustainable agriculture, which involves the use of BMPs, gradually replacing conventional modern agriculture (Jordan & Constance, 2008). Jordan and Constance (2008) indicated the

importance of emphasizing the entire farming system, including the connection between producers and consumers, along with community participation in the sustainable agriculture system, benefiting environmental, economic, and social goods. As a result, to establish a sound and healthy agricultural system, consumer input must be considered (Jordan & Constance, 2008).

Effective communication methods can facilitate knowledge-learning, idea-sharing, and information distribution about farming practices (King & Rollins, 1995; Leeuwis, 2004). Borisova, Racevskis, and Kipp (2012) recommended that farmers should engage the public in understanding their use of BMPs through the use of the Internet, public reports, leaflets, news stories, videos distributed via nongovernmental organizations, Extension, and mass media. Other than these listed channels which are mostly in print, interactive communication channels, such as neighbors, family, and friends, are also widely used as information sources (Gamon & Scofield, 1998). Farmers' markets, as an interactive information access point, have also been identified as a successful consumer-learning environment for farmers to share the practices they have used for food production and as a platform for Extension to distribute information and provide education (Abel et al., 1999). In this process, Extension educators can become involved in the information distribution process to assist with establishing the connection and communication modes farmers need to obtain consumers.

Understanding consumers' perceptions of BMPs is an important step in Extension educators' ability to develop and further promote Extension programs that emphasize local farmers' adoption of BMPs. By identifying consumers' attitudes and perceptions of BMPs, Extension educators can develop programs that increase farmers' awareness of the importance of adopting BMPs (Abel et al., 1999). Extension programs can also emphasize that farmers' sales may be secured or even increased as a result of consumers' willingness to support sustainable agricultural practices. Therefore, this study sought to identify consumers' perceptions, beliefs, trust, attitudes, and information preferences associated with farmers' use of BMPs. The information gathered from this research will benefit Extension educators who work on programs encouraging the adoption of BMPs. The second priority of the National Research Agenda is to enhance "new technologies, practices and products adoption decisions" (Doerfert, 2011, p. 8), which can be accomplished by this study through understanding the connection between consumers and farmers about BMPs. The findings of this study can be used to facilitate future expansion of Extension programs related to sustainable agricultural practices in an effort to enhance agricultural production while ensuring a sustainable environment.

### **Theoretical Framework**

The theoretical framework for this study was Social Exchange Theory (Homans, 1958). Homans (1958) described social behavior as "an exchange of goods, material goods but also non-material ones, such as the symbols of approval or prestige" (p. 606). Cook, Cheshire, Rice, and

Nakagawa (2013) reviewed the theory and indicated exchange behavior “is a function of payoffs, whether the payoffs are provided by the nonhuman environment or by other humans” (p. 62). Exchange is seen as an interaction between two persons or two parties and is associated with cost and value transferring between the subjects (Homans, 1958, 1961). People tend to perceive what they give as a cost and what they get as a reward. Therefore, cost and value transferring can influence the behavior in which an individual is more likely to engage as an exchange if they perceive they can receive the best profit through engagement (Homans, 1958). Homans (1961) also described the mechanism of reinforcement in social exchange behaviors. Reinforcement is the process associated with expectancy and behavior. It emphasizes that if an individual’s “expectation is confirmed and when the situation is repeated [similarly], behavior sequences will again be evoked” (Hilgard & Marquis, 1940, p. 88). Therefore, the two individuals, or two parties, involved in a social exchange behavior can reinforce each other’s behavior, while the exchange behavior is initiated according to their past experiences of reinforcement (Homans, 1961).

Dolisca, Carter, McDaniel, Shannon, and Jolly (2006) conducted a study to examine Haitian farmers’ participation in a forestry management program to improve environmental sustainability. The study found the surveyed farmers who had received benefits from engaging in forestry programs were more likely to participate in similar programs in the future (Dolisca et al., 2006). The findings also indicated farmers’ participation in forestry programs could be triggered by a possible income increase which program participation can bring (Dolisca et al., 2006). Additionally, farmers’ roles in local groups were found to positively influence their participation due to social, environmental, and economic reasons (Dolisca et al., 2006).

Zabkar and Hosta (2013) studied consumers’ environmentally-conscious behavior regarding green marketing. The findings of this study indicated consumers who were concerned about the environment tended to be more willing to engage in environmentally-conscious behaviors and were more likely to actually have behaved in an environmentally-conscious way (Zabkar & Hosta, 2013). Zabkar and Hosta (2013) also indicated the positive association of consumers’ willingness to behave in an environmentally-conscious way and their actual environmentally-conscious behaviors increased when consumers had a perception that they would achieve high social status. The findings of Zabkar and Hosta’s (2013) study were explained using the social exchange concept that consumers used money in exchange for status.

The concept of social exchange has been used to explain the relationship between Extension educators and clients (Galindo-Gonzalez & Israel, 2010; Israel, 1991). The relationship Extension educators have with their clients is one where clients request services, viewing Extension as an information source (Israel, 1991). Israel (1991) indicated the information Extension clientele receive from Extension educators can be seen as a reward, as well as the social prestige they might gain by becoming recognizable by adopting the BMPs Extension

educators suggested. However, the clientele also had to spend social costs, such as travel expenses, time used to receive services, extra communication effort by contacting other personnel, and further support for the Extension programs.

In Israel's (1991) study, patterns of preferred information channels among small farm operators were explored. The findings indicated the examined small farm operators had different preferences for information channels and suggested that Extension educators should develop sufficient coverage of programs, including information content, information channel, and service location, for the clientele to fulfill their different preferences based on the different cost/reward analysis systems each individual possesses. Moreover, Israel (1991) indicated the importance of trust in the social exchange system of Extension, suggesting trust between Extension educators and clientele should be examined to facilitate the services Extension offers (Israel, 1991). A related study conducted by Galindo-Gonzalez and Israel (2010) focused on Extension client satisfaction. The findings of this study also indicated the importance of trust in the Extension educator and clientele relationship. A recommendation was made that Extension educators should seek to understand clientele's satisfaction in order to establish trust by contacting clientele using their preferred information channels (Galindo-Gonzalez & Israel, 2010).

Based on Social Exchange Theory and past research, consumers who are more environmentally-conscious would be more willing to support actions associated with environmental protection. By supporting environmental protection actions, such as purchasing products from farmers engaged in BMPs, which is seen as an effort that can produce a cost, consumers would receive the perception of high social status, which is considered as a reward.

### **Purpose and Objectives**

The purpose of this study was to identify consumers' perceptions of BMPs used by Florida farmers to facilitate the development of farmer-oriented Extension programs which educate farmers about communicating with consumers to improve consumers' support of environmentally-friendly practices. The objectives of this study were to:

1. Identify consumers' perceptions of BMPs used by Florida farmers;
2. Identify consumers' beliefs, trust, and attitudes toward Florida farmers engaged in BMPs;
3. Identify the information sources and communication channels consumers use to stay informed about farming practices; and
4. Determine if there are differences in perceptions of BMPs used, beliefs, trust, attitudes, preferred information sources, and preferred communication channels based on demographic characteristics.

## Methods

This study was a descriptive study using an online survey research design to accomplish the purpose and objectives. A survey questionnaire was used to collect consumers' perceptions of BMPs used by Florida farmers, perceptions of importance of Florida farmers' engagement in BMPs, belief and trust of farmers using BMPs, information sources used to receive farming information, and participation in public events. The survey was distributed to residents 18 years of age or older in seven counties located in southwest Florida. The seven southwest counties in Florida were chosen because they were the targeted area of the County Alliance for Responsible Environmental Stewardship Program, which is a BMP-related Extension program.

Prior to asking respondents' perceptions of BMPs, the definition of BMPs was provided as specific behaviors that, when followed, have been found to assist in reducing water pollution into water resources and maintaining, or even improving, water quality and agricultural production (USEPA, 2013). Respondents' perceptions of BMPs used by Florida farmers were measured on four items using a five-point Likert-type scale ranging from 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Disagree nor Agree*, 4 = *Agree*, 5 = *Strongly Agree*. A similar scale was used to measure respondents' perceptions of the importance of Florida farmers' engagement in BMPs with four items on a five-point Likert-type scale ranging from 1 = *Not at All Important*, 2 = *Slightly Important*, 3 = *Important*, 4 = *Very Important*, 5 = *Extremely Important*. Respondents' beliefs and trust of farmers using BMPs were measured by three statements using a five-point Likert-type scale also ranging from 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Disagree nor Agree*, 4 = *Agree*, 5 = *Strongly Agree*. The information sources respondents used to receive farming information and their participation in public events were collected by a "select all that apply" question, with eight listed information sources and eight listed public events. Lastly, respondents were asked to answer several demographic questions including sex, race/ethnicity, age, county of residence, area of residence, educational level, annual household income, and political beliefs.

To ensure validity of the researcher-developed instrument, survey questions were reviewed by a panel of experts and then pilot-tested before data collection. The panel of experts included the Associate Dean for Extension at the University of Florida, the assistant director of the UF/IFAS Center for Public Issues Education, the legal advisor of the Florida Farm Bureau Federation, the public affairs manager of the Mosaic Company, the community investment specialist of the Mosaic Company, an assistant professor specializing in agricultural communication, and two assistant professors specializing in Extension education and survey design.

A nonprobability opt-in sampling method was used in collaboration with a public opinion survey research company. A total of 865 individuals were recruited by the public opinion survey research company and entered the survey. However, quota sampling was enacted to restrict the

participants to certain counties within Florida and ensure the respondents were representative of the county based on the county 2010 census profile for gender, race, and age. A total of 700 complete responses were collected, resulting in a participation rate of 81%. It is important to note the use of a nonprobability sampling method may lead to limitations including nonparticipation biases, selection, and exclusion (Baker et al., 2013). As a result, the interpretations of the results of this study are limited to the respondents. Once all the responses were collected, descriptive statistics, using SPSS® 22.0, were conducted to reach the objectives of this study. Chi-square analysis was used to examine the existence of differences among demographic characteristics of sex, race, and age.

The demographic characteristics of the respondents can be seen in Table 1. The respondents included 412 (59%) females and 288 (41%) males. The majority of respondents were Caucasian/White (Non-Hispanic) ( $n = 657$ , 94%), followed by African American ( $n = 19$ , 3%); while 4% of the respondents considered their ethnicity as Hispanic ( $n = 28$ ). The respondents were mostly aged between 50 and 79 (63%) with 27% ( $n = 189$ ) between 60 and 69 and 19% ( $n = 135$ ) between 50 and 59.

**Table 1. Demographic Characteristics of the Respondents**

Characteristic	<i>n</i>	%
<i>Sex</i>		
Female	412	58.9
Male	288	41.1
<i>Race</i>		
African American	19	2.7
Asian	6	0.9
Caucasian/White (Non-Hispanic)	657	93.9
Native American	7	1.0
Other	11	1.6
<i>Hispanic Ethnicity</i>	28	4.0
<i>Age</i>		
19 and younger	4	0.6
20-29	44	6.3
30-39	86	12.3
40-49	105	15.0
50-59	135	19.3
60-69	189	27.0
70-79	119	17.0
80+	17	2.4

## Results

### Perceptions of BMPs Used by Farmers

Respondents were asked their level of agreement or disagreement about the BMPs farmers in Florida practice on a five-point Likert-type scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Disagree nor Agree*, 4 = *Agree*, 5 = *Strongly Agree*) (Table 2). A majority of the respondents agreed or strongly agreed Florida farmers practice proper pest management ( $n = 367$ , 53%), water management ( $n = 358$ , 51%), and nutrient management ( $n = 353$ , 51%), while 51% of respondents ( $n = 288$ ) were undecided if they agreed or disagreed that Florida farmers practice proper sediment management.

**Table 2. Perceptions of Farmers' BMPs Use**

BMPs	Perception BMPs are Used by Farmers (%)				
	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neither Disagree nor Agree</i>	<i>Agree</i>	<i>Strongly Agree</i>
Pest management	0.9	4.9	41.9	44.6	7.9
Water management	1.9	7.4	39.6	41.0	10.1
Nutrient management	1.0	4.7	43.9	41.9	8.6
Sediment management	1.1	6.7	51.1	33.7	7.4

When asked the level of importance the respondents associated with Florida farmers' engagement in the BMPs on a five-point Likert-type scale (1 = *Not at All Important*, 2 = *Slightly Important*, 3 = *Fairly Important*, 4 = *Highly Important*, 5 = *Extremely Important*), 80% of the respondents ( $n = 560$ ) indicated water management as highly or extremely important, 72% ( $n = 505$ ) indicated nutrient management as highly or extremely important, 71% ( $n = 495$ ) indicated pest management as highly or extremely important, and 66% ( $n = 462$ ) indicated sediment management as highly or extremely important (Table 3).

**Table 3. Importance Associated with Farmers' Engagement in BMPs**

BMPs	Importance of Farmers' Engagement in BMPs (%)				
	<i>Not at All Important</i>	<i>Slightly Important</i>	<i>Fairly Important</i>	<i>Highly Important</i>	<i>Extremely Important</i>
Water management	0.6	1.4	18.0	35.1	44.9
Nutrient management	0.4	1.7	25.7	42.7	29.4
Pest management	0.4	1.7	27.1	43.7	27.0
Sediment management	0.4	4.3	29.3	37.4	28.6

### Beliefs, Trust, and Attitudes Toward Farmers' Engagement in BMPs

Respondents identified their beliefs, trust, and attitudes toward Florida farmers' engagement in BMPs based on three statements on a five-point Likert-type scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Disagree nor Agree*, 4 = *Agree*, 5 = *Strongly Agree*) (Table 4). Seventy-five percent of respondents ( $n = 525$ ) agreed or strongly agreed they believed farmers practicing BMPs care about the environment, 64% ( $n = 446$ ) agreed or strongly agreed they trust farmers practicing BMPs more than those that do not, and 68% ( $n = 473$ ) agreed or strongly agreed they would rather purchase products from a farmer that uses BMPs than one who does not.

**Table 4. Beliefs, Trust, and Attitudes Toward Farmers' Engagement in BMPs**

Category	Beliefs, Trust, and Attitudes toward Farmers' Engagement in BMPs (%)				
	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neither Disagree nor Agree</i>	<i>Agree</i>	<i>Strongly Agree</i>
I believe farmers practicing BMPs care about the environment.	0.3	0.9	23.9	51.7	23.3
I trust farmers practicing BMPs more than those that do not.	0.6	0.6	35.1	43.6	20.1
I would rather purchase products from a farmer that uses BMPs than those who do not.	0.4	1.0	31.0	41.1	26.4

### Information Sources and Communication Channels

Respondents were asked which information sources they used to receive farming information (Table 5). Information sources used by the most respondents were television ( $n = 384$ , 55%), newspaper ( $n = 375$ , 54%), and the Internet ( $n = 289$ , 41%). Respondents who selected "Other" indicated they also used books, research publications, Extension services, school courses, other personal contacts, and the radio as sources for farming information.

**Table 5. Information Sources Used to Receive Farming Information**

Information Sources	<i>n</i>	%
Television	384	54.9
Newspaper	375	53.6
Internet	289	41.3
Self-observation	253	36.1
Friends/families	153	21.9
Magazine	61	8.7
Attending activities/events	48	6.9
Other	47	6.7

The respondents indicated the public events they attended (Table 6). Farmers' markets ( $n = 497$ , 71%), local festivals/fairs ( $n = 396$ , 57%), and sporting events ( $n = 265$ , 38%) were the public events with the most responses. For the respondents who chose "Other," church, concerts, community meetings, and art shows were the events in which they participated.

**Table 6. Public Events Participated in as Communication Channels**

<b>Information Sources</b>	<b><i>n</i></b>	<b>%</b>
Farmers' markets	497	71.0
Local festivals/fairs	396	56.6
Sporting events	265	37.9
Community volunteer activities	141	20.1
Seminar/conference	87	12.4
Other	59	8.4
Public workshops	54	7.7
Local farm expo	44	6.3

### Differences Based on Demographics

Differences in the areas of interest were analyzed by demographic characteristics (sex, race, and age) (Table 7). In respondents' perceptions of farmers' use of BMPs, the only difference between demographics was found in pest management in race ( $\chi^2(16) = 29.03$ ,  $p = .02$ ). As for the importance associated with farmers' engagement in BMPs, differences in sex were found in items of nutrient management ( $\chi^2(4) = 14.29$ ,  $p = .01$ ) and pest management ( $\chi^2(4) = 11.47$ ,  $p = .02$ ), while differences in age were found in pest management ( $\chi^2(28) = 48.84$ ,  $p = .01$ ) and water management ( $\chi^2(28) = 48.12$ ,  $p = .01$ ). When examining the differences between demographics in beliefs, trust, and attitudes toward farmers' engagement in BMPs, differences in sex and age were both found in beliefs ( $\chi^2(4) = 10.11$ ,  $p = .04$ ;  $\chi^2(28) = 51.30$ ,  $p = .01$ ). Demographic differences in information sources used to receive farming information were identified in sex and race in newspaper only ( $\chi^2(1) = 3.83$ ,  $p = .05$ ;  $\chi^2(4) = 21.71$ ,  $p = .00$ ), while differences in age were identified in newspaper ( $\chi^2(7) = 91.31$ ,  $p = .00$ ) and television ( $\chi^2(7) = 33.42$ ,  $p = .00$ ). As for respondents' public events participated in as communication channels, demographic differences were found in sex in sporting events ( $\chi^2(1) = 18.24$ ,  $p = .00$ ), local festivals/fairs ( $\chi^2(1) = 10.52$ ,  $p = .00$ ), and farmers' markets ( $\chi^2(1) = 5.21$ ,  $p = .02$ ), while differences in age were identified only in farmers' markets ( $\chi^2(7) = 86.42$ ,  $p = .05$ ).

**Table 7. Differences Based on Demographics**

Items	Sex		Race		Age	
	$\chi^2$	<i>p</i>	$\chi^2$	<i>p</i>	$\chi^2$	<i>p</i>
<i>Perceptions of Farmers' Use of BMPs</i>						
Sediment management	7.06	.13	19.33	.25	16.14	.96
Nutrient management	3.21	.52	24.29	.08	39.64	.07
Pest management	2.89	.58	29.03	.02*	28.21	.45
Water management	2.82	.59	12.63	.70	28.82	.42
<i>Importance Associated with Farmers' Engagement in BMPs</i>						
Nutrient management	14.29	.01*	10.07	.86	31.08	.31
Pest management	11.47	.02*	7.33	.97	48.84	.01*
Sediment management	8.38	.08	5.40	.99	25.41	.61
Water management	2.83	.59	13.35	.65	48.12	.01*
<i>Beliefs, Trust, and Attitudes toward Farmers' Engagement in BMPs</i>						
Beliefs	10.11	.04*	8.81	.92	51.30	.01*
Attitudes	5.35	.25	16.02	.45	38.75	.09
Trust	3.10	.54	11.45	.78	36.88	.12
<i>Preferred Information Sources</i>						
Newspaper	3.83	.05*	21.71	.00*	91.31	.00*
Television	2.89	.09	3.63	.46	33.42	.00*
Friends/families	2.77	.10	7.99	.09	11.45	.12
Internet	1.23	.27	5.28	.26	11.31	.13
Other	.51	.47	2.33	.68	6.70	.46
Magazine	.09	.77	2.78	.60	5.25	.63
Attending activities/events	.05	.82	4.65	.33	6.87	.44
Self-observation	.02	.89	5.55	.24	9.33	.23
<i>Preferred Communication Channels</i>						
Sporting events	18.24	.00*	.89	.93	85.01	.06
Local festivals/fairs	10.52	.00*	3.62	.46	55.34	.82
Farmers' markets	5.21	.02*	3.28	.51	86.42	.05*
Seminar/conference	3.65	.06	5.41	.25	60.38	.67
Community volunteer activities	1.80	.18	2.02	.73	67.96	.41
Public workshops	1.47	.23	7.15	.13	44.42	.98
Other	.23	.63	6.52	.16	51.25	.91
Local farm expo	.08	.78	1.72	.79	54.94	.83

\*Significant difference was found at the .05 level.

### Conclusion

The findings of this study showed almost half of the respondents perceived that Florida farmers practice proper BMPs. However, the other half were undecided if Florida farmers practice proper BMPs. Despite being undecided about the actual practices in which farmers engaged, the

majority of the respondents perceived farmers' engagement in BMPs to be highly important. These findings agreed with the findings from Schultz (2001) and Wray-Lake et al. (2010) when they discovered the general public was aware of the importance of environmental quality and protection.

When investigating respondents' beliefs, trust, and attitudes toward farmers' engagement in BMPs, the findings indicated the majority of respondents 1) believed farmers' use of BMPs shows they care for the environment, 2) trusted farmers who practice BMPs more than those who do not, and 3) preferred to purchase products from farmers practicing BMPs compared to those not practicing BMPs. The findings of this study were similar to those of Zabkar and Hosta (2013) which indicated consumers' concern about the environment is positively associated with their willingness to perform environmentally-conscious behavior with an exchange concept, as well as the findings of Yiridoe et al. (2005) which indicated consumers' perceptions of agriculture and their attitudes and behaviors associated with food purchases reflect their concern about the environment. In this study, most of the respondents agreed that farmers should engage in BMPs and indicated their willingness to provide credit to farmers engaging in BMPs by offering them their trust and willingness to place value on purchasing their products. Since this study was descriptive in nature, the associated levels between respondents' environmental concern and their behavior related to environmental protection was not identified. Overall, the findings of this study aligned with Social Exchange Theory (Homans, 1958) and can be explained according to the similarity between the findings of this study and Zabkar and Hosta's (2013) study. The respondents' perceived importance of farmers' engagement in BMPs led to their beliefs that farmers care about the environment, which is shown through farmers practicing BMPs. As a result, respondents would consider expending costs, which were their trust and willingness to purchase in this case, in exchange for rewards, which could be a positive feeling of protecting the environment and an improvement of their social status.

In this study, the potential communication channels providing farming information and interactive opportunities were similar to those described by Leeuwis (2004) and Galindo-Gonzalez and Israel (2010). Most of the respondents received farming information from mass media, such as television, newspaper, and the Internet, while personal observation, interactive information sharing through family and friends, and participation in activities and events were also reported by respondents as communication channels used. Moreover, the findings indicated the importance of farmers' markets and local festivals and fairs as communication channels. As suggested by Israel (1991), sufficient information coverage through information channels can benefit Extension clientele's preferences based on an individual's cost/reward system for exchange. Therefore, the findings in this study, which indicated a wide range of information channels the respondents preferred to use, can be tied back to the exchange concept similar to the findings of Israel's (1991) study.

While differences between demographics in respondents' opinions were also examined in this study, different response patterns were revealed in different demographic characteristics. Such results indicated some of respondents' perceptions, uses of information channels, and participation in public events differed by sex, race, and age.

### **Implications**

Based on the findings of this study, the key implications for Extension educators are the need to connect the general public with farmers through the proper communication channels so more information about BMPs can be disseminated. According to the findings, a knowledge gap was found with almost half of the respondents unable to make clear decisions about their agreement or disagreement that Florida farmers practice proper BMPs. Moreover, within the four listed BMPs, the water management BMP was perceived as an extremely important BMP and received the most responses that it was practiced properly by Florida farmers. Conversely, the sediment management BMP received the most responses as undecided whether or not it was practiced properly by Florida farmers, while the least number of respondents perceived it as a highly or extremely important BMP. These findings indicated differences existed in respondents' familiarity with the different types of BMPs, and also implied people are more aware of subject matter closer to their life.

Three-fourths of the respondents agreed or strongly agreed they believed farmers practicing BMPs care about the environment, but the proportion of respondents dropped by 11% when asked about their trust of farmers practicing BMPs, and dropped by 7% when asked if they would support farmers practicing BMPs. These findings implied trust with farmers may be developed on more than just farmers' engagement in BMPs. Moreover, even though most would be willing to support farmers who practice BMPs, some may have other concerns taking higher priority than support of farmers using BMPs when making food purchases. According to Social Exchange Theory (Homans, 1958), people's decisions to perform a certain behavior, such as purchasing products from farmers who practice BMPs, will need an evaluation process regarding the cost and reward transfer (Cook et al., 2013). People who have a high level of trust and therefore support for farmers using BMPs, are receiving the sufficient profit from exchanging their financial resources when purchasing products with farmers' engagement in environmentally protective practices and will continue to be more likely to continue this behavior.

When examining preferred communication channels, the respondents of this study indicated they preferred to use mass media and interactive events, such as farmers' markets, as communication channels. This finding supports Borisova et al.'s (2012) study that all of the identified information sources in this study can be used to spread farming information, and the study of Abel et al. (1999) which described the importance of farmers' markets as information sources and educational avenues. However, although 71% of respondents indicated they attended

farmers' markets, only 7% of respondents reported their use of attending activities and events as information sources for farming information. This finding implies farmers' markets have not been used as an information distribution point properly in the studied area.

Lastly, the differences between demographic characteristics of sex, race, and age in this study were found in certain perception and communication channel items. Such findings imply respondents in different races may have different understanding about farmers' use of nutrient BMPs, while respondents' in different sex and ages may have different levels of concerns and beliefs about farmers' engagement in certain BMPs. Additionally, sex, race, and age may influence respondents' selection of using certain communication channels.

### **Recommendations**

Extension has made efforts toward educating farmers on the importance of using BMPs and even management strategies for BMP application to protect the agricultural environment (Allen et al., 1991; USEPA, 2010; Young, 2011). According to the findings of this study, consumers did perceive practicing BMPs as important, and therefore, Extension should continue its efforts regarding current BMP-related educational programs to keep farmers updated on new technologies and try to reach farmers who have not been involved in programs emphasizing the implementation of BMPs.

Findings also indicated the existence of a knowledge gap in terms of consumers' understanding of the actual BMPs of which farmers engage. Thus, further emphasis should be placed by Extension on BMP educational programs associated with communication to connect farmers with consumers around specific BMPs that may seem foreign to consumers. As Jordan and Constance (2008) suggested, consumers should be considered as a part of a sound agricultural system for environmental, economic, and social goods and therefore be engaged in the conversation as the separation between farmer and consumer are leading to these identified knowledge gaps.

When developing Extension programming, Extension educators should consider incorporating tips on how to use the information sources and communication channels suggested by this study. Extension, as an authorized information source, could help farmers spread information about environmentally-sustainable farming practices by providing related information through mass media and on state and county Extension websites and other online sources. Other than being visible on mass media and the Internet, farmers' markets should be used as an interactive opportunity for farmers to communicate directly with consumers (Abel et al., 1999). The communication should use a language consumers can understand through conversations started from topics which directly relate to a consumer's daily life (e.g., water use) and are attractive to the consumers to facilitate their understanding of agriculture (Leeuwis, 2004).

Future studies are also recommended based on the findings of this study. In order to provide thorough recommendations to Extension to improve the effectiveness of BMP educational programs targeting consumers, differences between demographics should be located by each characteristic in future studies. Similar studies can be conducted in different areas of Florida and other states to explore the results in different locations where programs may not be focused on BMPs. Comparison studies can also be conducted to explore variations of people's perceptions in multiple locations. A correlational study analyzing the relationships between people's perceptions of BMPs and trust and willingness to purchase could be used to further examine relationships and to investigate and demonstrate the existence of possible trends. Moreover, factors impacting consumers' trust in farmers beyond farmers' engagement in BMPs should be further examined and the use of communication channels suggested by this study should be evaluated to ensure the effectiveness of these strategies to further optimize their success.

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