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Research Article

Perception of organic farmers towards organic agriculture and role of extension

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ABSTRACT

The sustainability of organic agriculture is associated with the farmers' experience, quality of information provided, management of risks, and compliance with legislation. The objectives of this study were to identify the sources used by the organic farmers to gain information related to organic production, and to assess organic farmers' perceived attitudes towards extension services. To address the research objectives, in-depth semi-structured interviews were conducted with 10 organic farmers in central Pennsylvania. The interviews were digitally recorded and transcribed verbatim, categorized and coded, then thematically analyzed using an interpretive description methodology. The results showed that the extension services were not identified as a primary source of information that was frequently used by the organic farmers. Other organic farmers and organizationa for organic agriculture were the two primary sources of informaiton. The organic farmers were very adept at building social capital in seeking informaiton to address their issues and problems. The primary challenges faced by the organic farmers were the control of insects and weeds, and weather-related issues. The results highlighted that in addition to identifying viable information sources, factors such as adaptive capacities to climate change and certification were key to successful production in organic systems. The present study provides rich and deep information on how farmers perceive organic agriculture and extension services. The outcome of the research undertaken will enable planners, policy makers and the related Cooperative Extension personnel to better understand perceptions of the farmers to devise viable and workable policies and plans that address the concerns and challenges of the farmers.

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1. Introduction

Organic agriculture is the fastest growing agricultural sector in the United States. The Certified Organic Survey documented that organic farmers and ranchers sold around \$7.6 billion in organic products in 2016, which is a 23% increase compared to 2015 sales (USDA, 2017). Third party regulators typically manage the organic certification and labeling process. Growers desiring to have their proucts officially labeled as organically grown are required to complete the certification process (Mosier and Thilmany, 2016). The

organic market is expanding because there is high demand driven by perceptions and beliefs among consumers, and there is also increased general public support for organic producers and their products (Nguyen et al., 2019; Soroka and Wojciechowska-Solis, 2019).

Organic agriculture production and sales of organic food have expanded rapidly, and agricultural extension has the opportunity to develop and deliver organic educational programs for organic farmers to ensure information is available to all farmers, both conventional and organic farmers (Parker and Lillard, 2013). However, there are many challenges for extension agents desiring to reach organic growers which include limted engagement with organic farmers, limited information on organic agriculture, and limted training among extension workers (Constance and Choi, 2010; Lillard et al., 2013; Farmer et al., 2014). Extension has a role as a source of information for farmers that can play an important role to support sustainable agriculture and providing information on OA (Allahyari, 2009).

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Previous research has documented there is a need for extension and organic agriculture related research to support organic agriculture (Alotaibi et al., 2019; Barbercheck et al., 2012; Marsh et al., 2017). This research can elucidate the barriers to communication with organic farmers, and additionally, knowledge of the organic farmers' perceptions would be tremendously useful in developing stronger extension programs to support organic agriculture. Because of challenges that are facing farmers, understanding and assessing farmers' perception regarding OA and extension services are important to the development of OA in central Pennsylvania. The aim of this study was to understand and examine organic farmers' perceptions toward organic agriculture information sources and the role of extension. This aim was accomplished by achieving the following objectives; to identify the sources that organic farmers use to gain organic production information and to explore the organic farmers' perceived attitudes towards extension as an information source.

2. Materials and methods

2.1. Study approach and location

A qualitative approach was used to gain a deeper understanding of the perceptions of organic farmers. Qualitative data may be especially useful to educators who desire to understand how and why people act in their particular settings (Sutton and Austin, 2015). The study was conducted from March to July 2018 in Central Pennsylvania. Information from self-identified organic farmers was collected through the use of semi-structured interviews.

2.2. Selection of organic farmers respondents

In qualitative research, selection of participants at each site is one of the most important task a researcher can undertake. According to Lune and Berg (2016), a site is where access to potential study participants is possible. Because potential risk exists regarding confidentiality and/or anonymity for interviewees in qualitative research, the researcher must develop and build trusting relationships with those who participate in the study. The Central Pennsylvania organic farmers were recruited for study participation in Centre County Pennsylvania. The Organic farmers were selected based on the following criteria: sell their organic produce in farmers markets in the Centre County area; has practiced organic agriculture production for more than five years; grow fruits and vegetables, and agree to participate in the study interview as described in an informed consent letter provided before the interview.

Ten organic farmers (male and female) in the Centre County area in PA agreed to participate. The number of a sample interviewees fits between the range of 6–25 participants as suggested by Morse (1994) and Patton (2001) for qualitative approaches. In order to reach these farmers, some facilitators helped to make contacts at three farmers markets: the Downtown State College farmers market, the Boalsburg farmers market, and the North Atherton farmers market.

2.3. Interview process

The study used semi-structured, open-ended interviews to collect the data. Open-ended semi-structured interviews were designed to ensure open conversations with organic farmers. Interview participants voluntarily agreed to participate after they were informed about the study. The interview questions were ordered based on the research questions and were audibly recorded as well after participants' permissions were obtained. There are certain

steps for conducting the interview, according to Creswell (2007a). The first step is to ensure the research questions are asked in an open-ended manner. Second, interviewees must be identified, and the type of interview such as face-to-face or telephone interviews must be determined. Next, when conducting face-to-face interviews, the researcher must make sure to have adequate recording procedures. Step four is to use an interview protocol.

Interviews were conducted at farmers' market locations and ranged from 10 to 20 min. According to Creswell (2007b), time is important when collecting qualitative interview data, and he recommends conducting one or two trial interviews so the investigator can determine the approximate amount of time needed to obtain the information. Based on those trial interviews it was determined the investigator would need 45–60 minutes to conduct each interview. The researcher worked with each organic farmer to determine the time and location for the interviews. The farmers all preferred to conduct the individual farmers interview on site at the respective farmer market location at the end of the day between 4 and 5 pm because of the decrease in number of customers. Finally, after the interviews were conducted and recorded, the interview data were transcribed. Data management procedures were used to ensure participants' anonymity and confidentiality.

As shown in Fig. 1, four areas of information were collected to reflect the farmers' information: namely, farmers' demographic attributes (experience, scope of operation, farm family, experience with the organic certification process, and marketing channels), information sources, role of cooperative extension, and challenges recently faced in organic farming and its effect.

The study framework was conceptually based in adult education learning theory (Franz, 2007; Boyle, 1981; Merriam et al., 2007; Norris, 2003), communication theory (Bettman, 1979; McGuire, 1984) and behavior change theory (Ajzen, 1985; Prochaska et al., 1992). Adults such as organic producers, are self-directed learners that often are focused on solving and managing their problems that want to be actively engaged in a problem-solving learning environment. Communication theory substantiates that adults learn well through dialogue with others and reach outside their immediate realm for relevant information and information sources. Behavior change models demonstrate that individuals typically go through five stages as they contemplate adopting a new behavior of new technology. Franz (2007) specifically addresses how the conceptual theories of adult learning help us understand adult learners in relation to informing Cooperative Extension's transformation to a more issues-based programming approach in an effort to address the needs of new audiences.

2.4. Data analysis

The process of data analysis followed basic principles of content analysis (Neuendorf, 2017). The data were stored, categorized, and labeled with an open code/label. Strauss (1990) indicate once phenomena in data are identified, then the researcher may group concepts. This grouping process is called categorizing. The qualitative

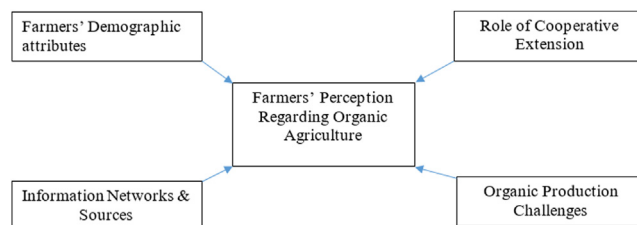


Fig. 1. Conceptual model of the study.

coding process used the framework developed by Saldaña (2016). A descriptive code name was developed for each code based on the research questions and farmers' responses. Once the open coding process was completed, then axial coding work was completed on the data. Strauss and Corbin (1990) define axial coding as “a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories” (p. 96). The 10 individual overall cases were coded in this way as well as the nested cases. These embedded cases were analyzed against each other to see differences and similarities and to draw conclusions to support the larger single case study analysis. Data tables were developed using the transcribed interviews and themes were pulled from these tables. Finally, a peer review process was utilized in the data analysis phase. Two peer reviewers analyzed the coding tables and were asked to comment on the results of the data analysis.

2.5 Verifying the quality of the information

According to Dooley (2002) the case study method is effective at verifying the quality of the study and to strengthen the findings of the research. This triangulation of data, or “establishing converging lines of evidence” will add to the quality of the study (Yin, 2012). The researcher utilized interviews, document review, member checking and a peer review process in the coding process to enhance the reliability of the data. These activities support Creswell's (2007b) “characteristics of a “good “qualitative study” (p. 45). Creswell's characteristics include utilizing multiple forms of data, utilizing evolving design methods that understand the unique discovery nature of qualitative research design, using an appropriate approach to qualitative research, seeking to understand core ideas based on the research questions, outlining and using detailed research methods, using multiple levels of data analysis, writing the study in a clear and engaging manner, positioning the researcher in the study, and finally engaging in an ethical study that has appropriate input from the institutional review board (Creswell, 2007b).

3. Results

3.1. Profile of the farmers interviewed

Interview participant demographics regarding gender, years of organic experience, organic production, crops, farm family,

Table 1
Summary profile of the organic farmers interviewed.

Farmer ID	Gender	Experience (Years)	Organic Production (Acres)	Crops	Farm Family	Certification	Marketing
1	Male	5	1.5	- Vegetables	No	No	- Farmers Market
2	Male	20	74	- Vegetables - Grass fed cattle	No	No	- Direct market to consumers
3	Female	6	1	Vegetables including 2 hoop houses load tunnels	No	No	-Farmers Market - Farmers Online Market
4	Male	11	10	Vegetables	No	Yes	- Farmers Market - Cooperative - CSA harvest shares
5	Male	5	4	Vegetables	Uncle	No	- Farmers market
6	Male	6	1	Vegetables	No	No	- Farmers market - Grocery stores
7	Male	40	300	Fruit	Both sons	Yes	- Whole sale to distributor - Supermarket chains
8	Male	30	3000	Fruit	All children	Yes	- Whole sale to distributor - Supermarket chains - Farmers market
9	Female	22	Greenhouses (4 Acres)	Vegetables	Father	No	- Supermarket chains - Farmers market
10	Male	26	4	Vegetables	No	No	- Farmers market

certification and marketing are summarized in Table 1. Several questions were to gain a context of the farmers' experience growing organic production, crops and participated in the organic certification process. The sample of farmers in organic farming households included 8 male farmers and two females. Farmers reported a history growing organic ranging from 5 years to 40 years. All of the organic farmers produce crops such as vegetables and/or fruit.

3.2. Farmer Information Sources

Each organic farmer was asked to describe the sources of information they use to gain general information regarding the production of their organically produced products.

All farmers indicated networking was a frequent and important source of information. Farmers indicated networking meant direct face-to-face interactions with other organic producers including family members and friends. The following statements capture the essence of direct networking with trusted peers as an effective information source for gaining information.

“In general. Often it is through connections with other farmers that also are farming organically. So, it would be networking.”
Farmer 3

“I get a lot of my information from speaking with my peers.”
Farmer 7

Sometimes the initial network contact doesn't provide information regarding organic agriculture; however, that contact provides a link to an unknown peer farmer that subsequently provides the desired information. Farmer 4 indicated that his contact with a family member (his son) led to a subsequent contact with a peer farmer.

“He (his son) talks to other farmers, particularly ones who have already been practicing organic agriculture”. Farmer 4

Thus by direct contact with a family member the farmer expanded his network to include other peers. Referrals by word-of-mouth appear to be commonplace and a trusted and credible source of information.

Farmer 5 indicated another key source of network contact included providers of organic farming product supplies including sales personnel. Farmer 5 during the past 15 years has transitioned from a dairy farm operation to a 26 acre organic vegetable production operation. His prior dairy experience and interactions with

sales personnel may have contributed to his/her being the only farmer to mention sales personnel.

Organizations, organic certification agencies and marketing associations were identified as an important and valuable source of information. Not surprisingly these organizations sponsor a variety of conferences, educational exhibits and materials, workshops, demonstrations, and, in some cases, social activities. Their outreach activities are varied and relatively easy to access. The following excerpts reflect the value organic farmers place on two organizations and associations identified as primary source of information.

“In Pennsylvania, there’s a certifying agency called Pennsylvania Certified Organic (PCO). You can search on the internet and you can Google that and it’ll come up with plenty of information about organic production.” Farmer 10

“I became associated with the organic protocols through Pennsylvania Certified Organic, who was the certifier of that farm. So that’s how I mainly learned and got the base knowledge. If I ever have a question now about organic practices, I usually call PCO or look it up online.” Farmer 6

Pennsylvania Certified Organic’s USDA PCO is a non-profit organization (third party certifier) that educates and certifies organic operations based in Pennsylvania, Delaware, Maryland, New Jersey, New York, North Carolina, Ohio, Virginia, West Virginia and the District of Columbia. PCO provides education, inspection and certification for organic farmers (<https://www.paorganic.org/>).

“We do go to some conferences and meetings that we like. PASA Conference would be one.” Farmer 2 and Farmer 3 and Farmer 4 reported literally the same comment.

PASA (Pennsylvania Association for Sustainable Agriculture) represents a network of local peer farmers that openly share their knowledge via conferences, research based literature and workshops. PASA conducts a farm based, participatory oriented approach to research. PASA also sponsors farmer training and development programs. The mission of PASA is “We’re a community of farmers and supporters, focused on education and evidence-based research, for the purpose of building a more economically-just, environmentally-regenerative, and community-focused food system”. (<https://pasafarming.org/>) Organic certification, and the cooperative spirit, are the common links between our farms. Two other organizations were identified as sources of information.

Farmer 4 indicated he also is a member of Tuscarora Organic Growers, and receives some information from them. Tuscarora Organic Growers is a farmer cooperative and with organic certification and the cooperative spirit being the common links between the farmer members (<https://www.tog.coop>). Additionally, Farmer 1 indicated “Usually I pick up most of the information for these practices from attending the meetings put on by the extension service and vegetable conference we attend every winter at Hershey, the Mid-Atlantic Vegetable Conference.

Organic farmers interviewed exhibited characteristics of being self-directed learners through their descriptions of participating in non-formal education activities to gain information and knowledge they desired. These non-formal education activities were grouped into accessing information in two forms. First they accessed information in traditional print formats, and second they accessed information using current internet technology.

All farmers engaged in a variety of self-directed, non-formal learning using traditional published materials including books, magazines, articles, catalogues and bulletins. Additionally two farmers specifically indicated that they “try things on their own and personally experiment” by themselves. The following excerpts illustrate the types of printed materials they accessed.

Farmer 9 indicated “Well, sometimes I read magazines and that sort of thing,”

“Okay. That is probably just little magazines that we get in the mail. We’re small as it is, mainly out of the house, family-type operation. Yeah, no big publications”. Farmer 2

“I get some information from reading periodicals.” I read Organic Farming and Gardening, and I read Acres USA. Farmer 7

“So, in those days, it was largely through books. . . There wasn’t even the internet back in 1988. So that was how we did it mostly was through word of mouth and by books that had been written by people that were participating or experts in the field”. Farmer 8

“From my thumb, (personal experimentation) and also, newspapers such as organic articles in newspapers or in organic magazines. I rely on that quite a bit.” Farmer 5

“I’m just self-educating on this topic, so whatever information I learn I try to make note of that and incorporate that when I can.” Farmer 1

Only three of the farmers specifically indicated they used internet technology to access organic agriculture information. These three farmers were males with one being a recent college graduate. The other two farmers had been growing organically for 26 years and 40 years with operations exceeding 25 acres of organic production. One of these two farmers serves on an advisory board for a college of agriculture. The following are their rather succinct comments regarding their use of the internet.

Farmer 6 was succinct, “I look it up online”.

“And I get a little bit of information off the internet”. Farmer 7

And you can search on the internet and you can Google that and it’ll come up with plenty of information about organic production.” Farmer 10

3.3. Role of Cooperative Extension

University resources includes workshops, formal courses, internships and the resources provided through the Cooperative Extension System at Land Grant Universities. Only one farmer indicated a family member had completed an internship. His son had completed an internship at a 250 acre organic farm in south central Pennsylvania, and the son’s experience in completing the internship was and continues to be a valuable source of knowledge and information. Additionally Farmer 6 indicated that upon graduating from an agricultural college he worked for three (3) years on an organic farm and that “provided a base knowledge regarding organic (farming) and the organic certification protocols.” Through his college experiences he became aware of the organic farm where he worked.

The Cooperative Extension system personnel were not frequently mentioned as a direct source of information regarding organic farming or organic agriculture. Only two farmers indicated they had made direct contact with extension personnel in seeking information regarding organic farming questions. Typically the farmers indicated “never” and “rarely” in describing their direct interaction with extension personnel. Farmer 4 indicated that on one occasion he/she did contact an extension agent about a raspberry problem and a gooseberry problem, and the agent was “very helpful. That is the one time the most help is with raspberries.” Farmer 6 indicated he/she made contact with a master gardener. The farmer viewed the master gardener personnel as the “face of extension for responding to a question. They have a hotline that you can call into. And they are the ones that will help answer my questions.”

So why is there limited direct interaction with extension agents? Several reasons emerged. First, there appears to be a common perception that local extension personnel do not have current and reliable information regarding organic agriculture practices.

The following statements reflect the general views of organic farmers.

Farmer 3 indicated “Well if they do, they don’t come across that way to me.”

“And we found that most of them (local extension personnel) do not know very much about organic practices or organic agriculture. We don’t contact them because we know that they are not going to be able to help us with organic.” Farmer 4

“I know several of the local extension people. Extension is not very involved in organic agriculture. I don’t think they (Extension) have enough people to be involved in everything.” Farmer 10

Several farmers provided their perspectives on why local extension personnel may be perceived as not being a primary direct source of information for organic agriculture. One view is that land grant university leadership and other personnel and extension leadership did not take organic agriculture as an important initiative in the early years of the organic agriculture movement. Farmer 7 commented in the following:

I think it was a lack of knowledge, a lack of understanding and perhaps a lack of interest. I think for a long time organic was looked down upon by the conventional ag establishment as being perhaps wasteful or fine in small applications. For instance, oh organic, that is affine way to garden. But really to be honest, the ag establishment has been very slow to be really supportive of organic agriculture, but they’re coming.”

Farmer 8 adds to the perspective that organic farmers that embraced organic agriculture developed sources of information before land grant universities and extension developed educational materials and programs targeting organic agriculture farmers.

I (Farmer 8) started before extension had embraced organic agriculture. I never relied on them, so I kind of went out just on my own, very independent. So I really never got used to using them (local extension personnel).

Farmer 3 indicated Rodale had a well established reputation and credible resources, including publications, in organic agriculture. Rodale was an established player in organic agriculture before land grant institutions and Cooperative Extension.

The value of extension as a source for information reaches beyond direct interaction with extension personnel. Seven of the 10 farmers reported using either online or printed materials developed by extension. The following descriptions in farmers’ own words reflects the resources used and the value of those resources.

Farmer 1 ‘Well I have vegetable production guide put out by extension. It’s very descriptive of all the problems. ...Sometimes I go online and lookup information. ...there is a good website”.

“They have great publications. ...and they have how to do onions organic, scallions organic, and potatoes organic. They have not only how to grow them but how to sell them and market them. And, I think that’s phenomenal!” Farmer 8.

“The information that is available (from extension), is crucial. One of the publications I use is Fruit Production for the Home Gardener which is put together by extension.” Farmer 6.

“I read their (extension agents) articles in Lancaster Farmer or magazines where they write in.” Farmer 5.

3.4. Primary Challenges faced by organic farmers

The majority of the organic farmers did not apply for participation in the organic certification because of the high cost of organic certification, increased inspections on their farms, and rigorous standards, and also they sell their products to people who trust them and are regular customers in the farmers’ markets in State College. However, one large organic farmer was worried about the standards for certification being lowered because he felt that capitalist society wanted to lower the standards of organic agricul-

ture in order to make it easier to sell organic products, and he perceived that organic standards are currently being lowered.

The majority of recent challenges perceived by organic farmers can be categorized as insects, pest control, weeds, and weather. These challenges may have contributed to a lack of products. Extension agents have been unhelpful because organic farmers believed they know more than the extension agents about organic agriculture. Marketing was not a barrier to organic farmers because small scale farmers sell their organic products to local customers. The challenges in the next five years identified by organic farmers are price competition, sinking prices, insect control, climate change, and the government regulators allowing lower standards that organic farmers think are questionable.

4. Discussion

The study reported here set out to understand organic farmers’ perceptions towards extension and organic agriculture. The information provided by organic farmers reflects their capacity and adeptness of building social capital in addressing their issues and problems related to organic agriculture. The results of this study provide evidence that organic farmers view PASA, networking, and Pennsylvania Certified Organic as primary OA information sources. Networking was mentioned by organic farmers as the primary source of information, and also the number one way in which these organic farmers learned new practices. The results demonstrate that organic farmers use and recognize networking and interactions with others farmers as ways to manage their business practices, and also social learning between groups was an important factor impacting practices. These results are similar to those of previous studies (Crawford et al., 2015; Millar and Curtis, 1999). The literature (Blackstock et al., 2010; Pierrette Coulibaly et al., 2021) documents the importance of interaction or contact from a trusted source for achieving behavior change. Generally, the more credible the source in the eyes of the farmer the more likely the information will be considered and/or used. There are two concepts that contribute to source credibility-trustworthiness and expertise. For farmers, relevant experience and occupation are important factors that convince them regarding reliability of information. Organic farmers are no different than many other farmers. Access to similar and/or trusted networks is likely to enhance message uptake and the building of social capital. Moreover, all farmers reflect the importance of self-learning in enhancing their knowledge about organic agriculture via reading different materials and using internet. It could be concluded that adults have traditionally been viewed as self-directed learners (Kearsley, 2010; Knowles, 1984).

The results also indicated that extension was viewed by organic farmers as a supplementary source rather than a primary source for gaining information related to organic agriculture. Organic farmers viewed extension as more useful to conventional farming operators. Lack of dedicated organic extension programs has led organic farmers to feel that they know more about organic practices than extension professionals, and also farmers were not willing to pay for extension. These findings demonstrate that currently extension does not have a primary role in organic agriculture, but there is nevertheless potential that extension agents can increase their role in involvement in organic agriculture. There have been several efforts to rethink the role of extension and transform the system to effectively move from a rural, expert-based transfer of knowledge system to one that has the capacity to respond quickly to emerging issues thus making extension and land-grant partnership more accessible, meaningful, and accountable. For extension personnel at the local level, there may be an emerging role as a participatory educational broker bringing together the organic

farmer, the distributor and the consumer in identifying problems/issues and developing action plans aimed at achieving sustainable organic production learning communities. According to Kucińska et al. (2009) to enhance extension role in organic agriculture, extension agents and organic farmers should engage in open discussion to share the challenges they face and work together to develop the curriculum of organic programs for small organic farmers and any audience interested in organic practices.

According to interview responses, organic farmers adopted organic agriculture because of sales in markets, bio-diversity, health reasons, protecting the environment, and preferring not to use chemicals in their food. Their perceptions regarding organic agriculture were positive because they practiced organic agriculture based on what they learned from their experiences. These findings are in line with previous research (Oyesola and Obabire, 2011; Läßle, 2013).

The study also attempted to identify challenges regarding organic agriculture. In short, organic farmers face challenges such as pest control, weeds, and weather. These challenges may have contributed to a lack of products. The lack of organic programs among organic farmers might worsen these challenges. In this context, Brzezina et al. (2016) argued that implementation of organic food production principles in practice and continuous improvement is depended on farmers' adaptive capacity to climate change. Furthermore, fluctuation of prices is another challenge viewed by organic farmers as high risky. Stable prices and positive consumer perception is necessary to enable sustainable organic production (Bouttes et al., 2019)

This study has some limitations regarding selection of farmers. First, although organic farmers were encountered at farmers markets around State College, it is possible that the experiences and views of these individuals did not reflect the views of the organic farmers in the region. Second, there is a heterogeneity of the scale of production among the farmers interviewed. This might affect credibility of some results identified during data analysis.

5. Conclusions

This qualitative study provides rich and deep information on how farmers percept organic agriculture. This study identifies that farmers continue to grow organic crops, amongst other things, because of perceived profitability, preserving bio-diversity of good insects, protecting health, preserving the environment, and not wanting to use chemicals that pose a risk to themselves and customers. Farmers mainly learned about organic agriculture through meeting with other farmers, news, publications, PASA, PCO, and reading. The study recommends that extension professionals should present themselves and provide organic programs in PASA and PCO, focus more on personal relationships with farmers, and include a networking approach as their priority in order to increase organic farmers' knowledge. Future research is recommended to determine barriers to adopting organic agriculture, and also it would be worthwhile to conduct research to determine the role of extension agents in organic agriculture and also the barriers perceived by extension agents regarding their role in the organic agriculture arena.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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