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Organic agriculture in Iran: Farmers' barriers to and factors influencing adoption

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Abstract

Organic agriculture is being promoted in Iran to address environmental problems resulted from the use of chemical materials in agriculture. Despite many advantages of organic agriculture, the results of several case studies show that its adoption rate is still very low among farmers. The purpose of this paper is to review previous studies that investigate the main factors influencing and challenges of adopting organic agriculture. The review included journal articles and conference papers from 2007 to 2012. The results showed that Iranian farmers have strong motives for the adoption, yet face challenges in certifying, marketing, access to reliable technical information, and credits. Given the review of factors that govern farmers' adoption of organic agriculture, key mechanisms for promoting farmers' adoption are discussed. Further research is needed to learn how to bring these mechanisms into play in Iran.

Key Words: organic agriculture, renewable agriculture, sustainable agriculture, farmers' attitude, small-scale farming

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Introduction

Organic agriculture (OA) is a production system that sustains the health of agro-ecosystems and people¹. Organic operation can contribute to a sustainable food production system², improve the employment opportunities, especially for women³, improve household food security⁴, enhance biodiversity⁵, and contribute to agricultural development⁶.

Many countries promote OA to avoid facing larger problems with unsafe food supplies, health problems, unsustainable agri-rural development, environmental degradation, among others⁷. In Iran, the advantages of organic farming are widely appreciated by different stakeholders including policy makers, extension workers, and researchers⁸. However, despite the rapid growth of OA in much of the developed world^{6,9,10}, the expansion of OA in developing countries, including Iran, has been much slower than the developed world⁷. Only one-third of the world's organic agricultural lands —12.5 million hectares— are located in these countries¹¹. In such countries, certified organic food productions are generally limited¹². Similarly in Iran, organic agriculture lands comprised 7,256 hectares in 2010. The key organic products in Iran consisted of pistachio (1,382 ha), wheat (1,156 ha), rose (900 ha), fig (780 ha), raisin (700 ha) and date (595 ha). In 2011, more than 95 percent of organic products in Iran were exported to European countries¹³.

The first Iranian national plan to promote sustainable agriculture was initiated in 1995, entitled Optimal Utilization of Fertilizers and Pesticides. The plan was a ten-year program aimed mainly at decreasing poisonous residuals in agricultural products. The plan could not achieve its goals after ten years, largely because of the low participation of farmers¹⁴. The process of the OA promotion is still in its early stages in Iran. IPM/FFS (Integrated Pest Management/Farmers Field School) are recognized as

extension approaches for promoting organic agriculture. High-level IPM (i.e., preventive practices to control pests) is considered a first step in promoting organic farming systems. The majority of farmers who are involved in the IPM/FFS projects in Iran are increasingly shifting to OA^{15,16}. Consequently, the IPM/FFS sites have been established in pilot farms throughout the country in search for more participatory approaches for the dissemination of OA¹⁷.

Despite the important impact of the IPM/FFS initiatives, the results of case studies¹⁷⁻²⁰ show that farmers have not adopted sustainable and organic farming practices entirely. What makes it difficult for policy makers and practitioners to promote OA in Iran is that Iranian farmers' motives and challenges towards adopting OA are still unclear. Because the issue has only recently come to the researchers' attention, there are few qualified research studies¹⁹. In addition, these studies have mostly considered experts' attitudes towards the dissemination of OA, not those of farmers. Finally, the case studies on farmers' attitude reported from different areas lack methodological consistency.

The purpose of this review was to identify and summarize previous studies on Iranian farmers' attitudes towards OA, with the aim of drawing a comprehensive picture of the issue. Furthermore, this article aims to identify mechanisms that may stimulate the adoption of organic practices among farmers.

Methodology

Case studies were reviewed to identify factors that influence farmers' decision to adopt OA practices (e.g., biological pest and weed control, composting, cover cropping, green manuring and green leaf manuring, intercropping, living fences, microbial bio-fertilisers, multi-cropping, and multipurpose trees). The main keywords used to obtain

the documents were “organic agriculture” and “organic farming” followed by a combination of “farmers’ attitude”, “farmers’ adoption”, “farmers’ challenges” and “IPM/organic”. IPM was included, because as mentioned previously, IPM/FFS have been the main mechanisms to foster OA through participatory tools in Iran. Among the articles, quantitative studies were selected which used questionnaires to determine farmers’ barriers to and motives for adopting IPM and organic practices. Some inclusion and exclusion criteria²¹ were used to conduct a more focused search. Inclusion criteria included studies that contained information about the adoption of OA practices, and assessed farmers’ point of views. Abstracts or unpublished studies were excluded from the review. The date of released documents, which were either in English or Persian, was limited to the five years (2007-2012). The data were obtained from four possible databases: Scholarly journals in Persian (n=13), Scholarly journals in English (n=6), Iranian conferences in Persian (n=12), and International conferences in English (n=3). Key findings of each study considered were those statistically significant factors affecting farmers’ attitude. Most articles used case study or survey methodology.

Results

Among the 34 reviewed studies, some discussed the farmers’ barriers of adoption, some addressed their motives for adoption, and others investigated both. The following presents our findings about the farmers’ barriers to and their motives for the adoption of OA.

Farmers’ Barriers

Table 1 describes the most important barriers of Iranian farmers to the adoption of organic farming.

Table 1

Certification. Some studies on the barriers of adopting OA in Iran found that certification is one of the main challenges for farmers^{19,22-25}. This has been mentioned as a critical challenge for farmers in many other developing countries as well²¹. According to the international rules, each farmer has to be inspected annually. In Iran, there are no national certification bodies that may verify organic products officially²⁵ and farmers have to utilize international certification bodies. In Iran, where 80 percent of farmers are small-holders, such a certification system is realized extremely expensive²⁶. Some authors proposed establishing a national institute for the certification of organic products^{25,27}. Mahdavi-Damghani²⁶ proposes a group certification system as an alternative way, in which farmers' groups consisting of a hundred to several thousand small-scale producers will be co-certified as a unit. Despite the differences amongst experts, there is consensus that certification is a barrier for the adoption of OA among Iranian farmers.

Market. Despite the global expansion of the market for organic products, it is still expanding very slowly in Iran^{25,27-31}, as in many developing countries. This is partly because organic products are more expensive than other products³² and the majority of Iranian people cannot afford organic products^{25,33}. Therefore, farmers are not sure whether they can sell their products in the national market²⁸. Sari and colleagues³² suggest that to overcome this challenge, the government should establish specific sites for selling organic products. This will decrease the costs of marketing for producers and therefore, the price of organic products. Furthermore, sufficient information about the

benefits and standards of organic products is not available to both producers and customers⁵⁵. Lastly, certification systems are considered by some authors as the root of many challenges for marketing organic products^{23,24}.

Knowledge and information. Lack of knowledge and information is reported by many researchers as a barrier to the adoption of OA in Iran^{17,24,25,27,31,15,34}. Knowledge and information barriers relate specifically to market²⁵, and technical and financial issues²⁰. Bello²⁶ believes that farmers in many developing countries lack technical information about farming practices, production and marketing methods such as choosing products to grow, identifying different markets and distribution channels, competition strategies, and market access.

Workload and costs. Previous studies have shown that organic farmers have greater labour needs compared with conventional farms^{20,27}. Since many activities, such as weeding, are done manually in OA, there is a need to recruit more workers²⁰. Additionally, OA can require more facilities for transport and storage, which are quite costly for farmers²⁵. Moreover, the transition period to OA might be costly. Wossink and Kuminoff³⁶ consider that a farm in transition from conventional to organic needs to keep rigorous records for three years before being fully certified an additional cost for farmers.

Influences on Farmers' Adoption of OA

Despite the barriers, there are factors that influence the adoption of OA practices by Iranian farmers. Findings are summarized in Table 2.

Table 2

Experience. Some studies show that more experienced farmers with a higher level of informal knowledge are keener to learn about sustainable farming practices^{18,15,37,38}. The traditional agriculture of Iran is a great deal like OA in many ways⁸. Mahmoudi and colleagues⁵ believe that almost all practices and processes in the traditional agro-ecosystems of Iran are compatible with organic agriculture⁵. Therefore, years of experience in traditional agriculture can support farmers to appreciate and more easily adopt OA practices. Moreover, such an experience provides them with increased knowledge about the environment in which decisions for adopting OA must be made³⁹. This seems to be a rather unique finding among developing countries.

Age. Age is positively correlated with experience in some studies³⁹. Evidence shows that in Iran, older and more experienced farmers have a more positive attitude towards OA and IPM^{18,38,40}. Although few studies show that younger farmers are less risk adverse and may adopt organic practices sooner¹⁰, some research has found that both groups of experienced and younger farmers who participate in extension programs (especially IPM/FSS) are more likely to adopt organic practices^{38,40,16}.

Gender. The term “feminization of agriculture” is becoming a cliché that refers to the significant role that women play in the agricultural sector⁴¹. Some studies show that women are generally more willing to adopt organic practices^{37,42}. OA supports gender equality because it creates meaningful work, offers economic opportunities for women, encourages biodiversity and traditional knowledge, and ensures equitable work standards⁴³. According to Kang⁴⁴, women are the major stakeholders in OA because,

over decades, the socio-economic and health statuses of women in farming communities have been adversely affected by conventional farming technologies and policies.

Education and knowledge. Both scientific and indigenous knowledge influences farmers' attitude towards organic adoption. The positive impact of farmers' education on adoption was found by Omani and Chizari⁴⁵, Razzaghi-Borkhani and colleagues⁴⁰, also and Sadati and colleagues¹⁰. Generally, educated farmers can acquire technical information more easily³⁹. Farmers' education is identified as an influencing factor on organic adoption in other developing countries as well⁴⁶. Behrad-far and Farzanian⁴⁷ believe that in OA, modern knowledge is not in contradiction with traditional knowledge, but is complementary to it. Sofia and colleagues⁴⁸ explain that organic farming has been practiced since ancient times. As such, the values and principles of OA, including the principle of health, ecology, fairness and care⁴⁹ are in line with the traditional beliefs and values of farmers.

Income, yield, and land area. Organic farmers can experience an increase in production costs because of the introduction of labour-intensive technologies. In addition, farmers face new costs related to certification and transportation⁵⁰. Therefore, higher incomes might facilitate the adoption of OA by farmers. According to Kassie and colleagues⁴¹, wealth affects adoption decisions, since wealthier farmers have greater access to resources and may be better able to take risks. Similarly in Iran, some studies^{10,42,45}, Ghorbani and colleagues^{51,52} show that farmers with higher incomes and larger farms are more likely to adopt OA. Yield is associated with income and land area in many small farms, and influences the adoption of OA^{29,45}. These factors seem to be common around the world in regard to the adoption of OA^{50,53} and other innovations⁵⁴.

Extension services and communication. Many studies^{19,15,16,42,51,55} show that the Iranian farmers' participation in extension programs will enhance their tendency to adopt organic farming practices. However, Behrad-far and Farzanian⁴⁷ found that extension workers in Iran are generally not sufficiently capable of providing assistance with organic methods. To overcome this deficiency, FFS programs have recently been launched and are considered as the best training methods for farmers interested in organic agriculture⁵³.

Some studies^{10,15,40} show that by increasing farmers' access to information and communication technologies, they are more likely to adopt organic practices. Organic farmers should develop their communication skills to increase their access to the information about the latest achievements in agriculture. Furthermore, technical assistance should take into account farmers' communication needs in Iran^{15,40}.

Farmers' membership in cooperatives. A few studies^{15,56} show that farmers' membership or relationship with cooperatives increases their likelihood to adopt organic practices because they have better access to resources such as credit and extension services^{57,58}. Moreover, when a cooperative adopts OA, it attempts to generate information that allows contracting, production and marketing planning, communication, and monitoring, in order to keep organic production costs at a low level⁵⁹. This is in line with findings from Ethiopia⁴⁶ where the household's membership in farmers' organizations increased the likelihood of practicing organic techniques.

Government support. Studies^{29,15,51,32,52,60,31} also show that governmental support can be very critical in generating positive attitudes in farmers to adopt organic practices. According to Mahmoudi and colleagues⁶¹, it remains the responsibility of governments

to change the attitude of farmers toward OA and encourage them to produce organic products. Such support can be provided in five areas, including organic food production at the farm level, processing and marketing organic foods, out-of-home consumption, consumer information, and cross-cutting measures such as research and development⁶². The situation is the same in many developing Asian countries. According to Partap⁷, the governments in these countries are not providing minimum incentives to farmers, NGOs, small and medium-sized enterprises involved in OA. In Ethiopia, Kassie and colleagues⁴⁶ found that poverty limits OA adoption. This means those policies which aim at alleviating poverty can positively affect the adoption decisions.

Farmers' attitude. Some studies^{19,63} confirm that farmers' attitudes towards organic farming influence their decision to adopt it. Iranian organic farmers strongly believe that organic production is harmless and healthier for both the environment and human^{38,64,60}. Moreover, the long-standing values and beliefs of farmers are in line with the values of sustainable practices of organic farming^{37,63}. However, traditional beliefs that are in line with OA practices are declining. It appears that Iranian farmers now have a mix of traditional and modern values that drive them to adopt some organic practices, and reject those which are not productive or diminish their income. For example, a study by Bagheri and Shahpasand⁶⁴ on potato farmers' attitude toward sustainable and organic agricultural practices shows that some farmers had a negative attitude towards using fewer fertilizers and pesticides, while their attitude towards some methods of securing sustainability such as soil and water conservation and crop rotation, for instance, was positive. These same attitudes can be found in other developing countries⁶⁵.

Discussion and conclusion

There is growing evidence that increased adoption of organic farming can offer numerous environmental, social and financial benefits, and lead to an alternative way to sustainability in agriculture^{2,66,67}. The results of this study show that for Iranian farmers', there are some main challenges that slow down the process of adopting OA. These barriers include challenges in certification, market, access to knowledge and information, labour and costs. These barriers exist in many developing countries³⁶. Among them, certification seems to be the most serious problem in Iran, in comparison to other developing countries, due to Iran's limited international communications and lack of national certification bodies.

In spite of these barriers, there are some factors that influence Iranian farmers' decision to adopt OA practices. Experience is one factor that influences farmers to adopt OA. Since most Iranian farmers are older and experienced^{15,56}, such attributes can be regarded as an opportunity for the promotion of OA. Gender can also influence OA adoption, and studies found that women are better adopters of OA^{42,32}. Knowledge from both types of formal (education) and informal (indigenous) sources also has a positive effect on the adoption of OA. Income, land area and productivity have positive impacts on farmers' adoption as well. Extension services are important in the promotion of OA, especially IPM/FFS programmes that apply participatory methods for disseminating OA. Findings show that those Iranian farmers more likely to adopt OA are those who have a more positive attitude towards OA; have access to communication technologies; are members of cooperatives; and are farmers supported by the government. Similar findings are reported in other developing countries^{26,46,68,69}.

Implications for Current Practices on OA Adoption

Taking the findings of the discussed case studies into consideration, we make four recommendations to increase the adoption of OA in Iran: (a) appreciating the Iranian farmers' role in the process of adoption, (b) rethinking extension programs, (c) realization of the women's facilitation role, and (d) appropriate governmental support.

a) Appreciating the Iranian farmers' role in the process of adoption. Most factors which drive farmers to adopt OA are directly related to personal attributes of "farmers" (e.g.: experience, age, gender, education, knowledge, and attitude). However, the development of organic farming is led by the Iranian government through top-down processes¹⁵ that often disregard farmers' concerns and their characteristics. The critical issue is that in many extension programs at the rural level⁷⁰, wealthy farmers are the focus of the programs, while poor and small farmers are often ignored.

b) Rethinking extension programs. Providing extension services to increase organic farmers' yield and supply natural inputs are necessary⁵². Among other extension initiatives, FFS programs have been reported as the most successful in facilitating the adoption of IPM technologies in Iran³⁵. However, some studies show the unsatisfactory impacts of FFS programs, maintaining that they have been mainly successful in changing farmers' attitude and not their behaviour. Other studies show that it could not improve the farmers' collaboration over the long term. For example, a study by Etehad and colleagues¹⁵ shows that, from farmers' point of view, FFS has been very effective in providing relevant information, but not linking farmers, researchers and extension agents to each other over the long term, because the farmers' collaboration and linkages

with research and extension are limited to the project duration, and collapse once the project ends¹⁴.

c) Realization of rural women's facilitation role. It is important to understand that women are not merely the adopters of OA, but can also be important facilitators and promoters of organic practices among farmers, processors of agricultural products, and their family. According to Partap⁷, all over Asia, women are taking a leading role in OA development—as farmers, as consumers, or as the organizers of the organic sector. For instance, in Thailand and Malaysia, many of the pioneer traders of organic products are women. In India, the organic movement receives much support and leadership from women self-help groups, NGOs, and individual entrepreneurs. Similarly in Iran, rural women are generally more willing to adopt organic practices and are the main customers of organic products³². However, support and extension services for rural women are very limited. Etehadi and colleagues¹⁵ study on the effectiveness of IPM/FFS sites shows that only 11 percent of the participants were rural women. Men were also more satisfied by the IPM/FFS sites, which were originally planned for them. The main conclusion is that rural women's access to information and credit for organic production should be enhanced and an awareness of the importance of organic foods among rural women needs to be emphasized.

d) Appropriate governmental support. In the past, OA has been adopted without the support of governments and agricultural extension agencies in Iran. Especially in the early stages, farmers applied organic practices without any professional backup or infrastructure⁷¹. Today, the situation is different. Modern agriculture has resulted in the increased use of chemical inputs, causing adverse impacts on human health and the

environment¹⁵. Therefore, a critical role of the government is envisaged. According to Partap⁷, governments should consider providing direct incentives, rather than subsidies, to organic farmers. Moreover, there is a need to allocate resources and expertise to establish private institutions/agencies that can facilitate the adoption of OA. Such institutions can be managed by pioneer organic growers. Esmaili⁷² proposes that organic farmers should receive specific insurance services as a support from the government. Such insurance should cover the first three years of transitional period, yield losses as a result of diseases, and market failure, among others.

Abdollahi⁷³ believes that government supports should include subsidies, long-term loans, the establishment of organic farmers' organizations, and facilitating farmers' access to information about technical issues of OA and marketing. Additionally, Yaghubi and Naseri⁷⁴ suggest that the government can ease the access of organic farmers to information through holding workshops and exhibitions on OA. The government can also support organic farmers in the domestic market by purchasing their products in advance before harvest. The policies for developing organic farming should be formulated in a way that allows a bottom-up approach⁷⁵.

Implications for Future Research

The recommendations proposed in this article are expected to improve the rate of the OA adoption. Further research is needed to address how best to bring these mechanisms into practice. For instance, there is a need to assess the governmental supports for organic farming at the farm level. Moreover, the role of rural women, and their challenges and opportunities in adopting and promoting organic farming, should be studied. The effectiveness of existing extension methods for fostering OA should be

assessed on the bases of “region-case” and “crop-case”. Finally, future studies could address the weight of the different applied criteria in this study to come up with further insights into the decision making process, why farmers decide for or against the adoption of organic agriculture.

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References

- 1 IFOAM. 2009. Definition of Organic Agriculture. Available from: http://www.ifoam.org/growing_organic/definitions/doa/index.html.
- 2 Azadi H., Schoonbeek, S., Mahmoudi, H., Derudder, B., Maeyer P.De., and Witlox, F. 2011a. Organic agriculture and sustainable food production system: Main potentials. *Agriculture, Ecosystems and Environment* 144:92– 94.
- 3 Farnworth, C., and Hutchings, J. 2009. Organic agriculture and women’s empowerment, Germany: IFOAM.
- 4 El-Hage Scialabba, N. 2007. Organic Agriculture and Food Security. international conference on “Organic. Agriculture and Food Security, 3.-5. May 2007, FAO, Italy.
- 5 Mahmoudi, H., Sharghi, A., Vossoughi, Sh., and Salamat, Sh. 2009. Organic Agriculture as a Strategy for Improving Small Farmers' Livelihood in Iran. The 2nd International Conference on “Organic Sector Development in the Central/Eastern Europe and Central Asia, 10-11 September 2009, Georgia.

- 6 Darnhofer, I., Schermer M., and Schneeberger, W. 2008. Continuity and change in organic farming – Philosophy, policy and practice. *International Journal of Agricultural Resources, Governance and Ecology* 7(1/2):1-4.
- 7 Partap, T. 2010. Emerging Organic Farming Sector in Asia: A Synthesis of Challenges and Opportunities, a chapter in book “Organic Agriculture and Agribusiness: Innovation and Fundamentals”, Edited by Partap,T. and Saeed M., Published by the Asian Productivity Organization 1-2-10 Hirakawacho, Chiyoda-ku, Tokyo 102-0093, Japan , ISBN: 92-833-7090-2.
- 8 Malek-Saeidi, H., Rezaei-Moghaddam, K., and Ajili, A. 2012. Professionals’ attitudes towards organic farming: The case of Iran. *Journal of Agricultural Science and Technology* 14:37-50.
- 9 Willer, H., and Kilcher, L. 2009. *The World of Organic Agriculture - Statistics and Emerging Trends 2009*. Bonn: Research Institute of Organic Agriculture (FiBL), Frick, and International Federation of Organic Agriculture Movements (IFOAM).
- 10 Sadati, S.A., Shabanali-Fami, H., Kalantari, K., Mohamadi, Y., and Asakere, A. 2010. Investigating effective factors on attitude of paddy growers towards organic farming: A case study in Babol County, Iran. *Journal of Applied Sciences, Engineering and Technology* 3(4):362-367.
- 11 Willer, H., and Kilcher, L. 2012. *The World of Organic Agriculture - Statistics and Emerging Trends 2012*. Bonn: Research Institute of Organic Agriculture (FiBL), Frick, and International Federation of Organic Agriculture Movements (IFOAM).
- 12 Vossenaar R., and Jha V. 2007 .Trading opportunities for organic food products from developing countries (United Nations).

- 13 Kledal, P.R., Mahmoudi H., and Mahdavi Damghani, A.M. 2012. Organic food and farming in Iran. In H. Willer, and Kilcher, L. (eds.). The World of Organic Agriculture - Statistics and Emerging Trends 2012. Bonn: Research Institute of Organic Agriculture (FiBL), Frick, and International Federation of Organic Agriculture Movements (IFOAM).
- 14 Sharifi-Moghaddam, M. 2006. Report of the activities in IPM/FFS sites in Iran. Tehran:Ministry of Agriculture, Agricultural Extension and Farming System Department.
- 15 Etehad, M., Rusta K., and Gholi-Nia, M.J. 2011. Investigating the effectiveness of FFS approach in disseminating IPM practices from farmers' overview, case study Sistan and Baluchestan Province. Iranian Agricultural Extension and Education Journal 7(1):41-52.
- 16 Razzaghi-borkhani, F., Rezvanfar, A., and Shabanali Fami, H. 2010. The role of educational and communicational factors on the knowledge of Integrated Pest Management (IPM) among Paddy farmers in Sari county. Journal of Agricultural Education Management Research 13:2-17.
- 17 Etehad, M., Rusta K., and Mashhadi Bandani, N. 2010. Farmer Field School, an appropriate strategy to developing organic agriculture, The 3rd congress on Agricultural and Natural Resources Extension and Education, 2-3 March 2010, Mashhad, Iran.
- 18 Veisi, H., Mahmoudi, H., and Sharifi-Moghaddam, M. 2010. Identifying farmers' adoption of integrated pest management technologies. Journal of Iran Agricultural Economy and Development 4(41):481-490.

- 19 Rezvanfar, A., Eraktan, G., and Olhan, E. 2011. Determine of factors associated with the adoption of organic agriculture among small farmers in Iran. *African Journal of Agricultural Research* 6(13):2950-2956.
- 20 Karimi, E. 2011. Investigating the barriers of organic agriculture development. *Journal of Iran Agricultural Economy and Development* 2(42):231-242.
- 21 Azadi H., Ho, P., Hafni, E., Zarafshani K., and Witlox, F. 2011b. Multi-stakeholder involvement and urban green space performance. *Journal of Environmental Planning and Management* 54 (6):785-811.
- 22 Khaledi, M., Gray, R., Weseen S., and Sawyer, E. 2007. Assessing the Barriers to Conversion to Organic Farming: An Institutional Analysis, Department of Agricultural Economics, University of Saskatchewan.
- 23 Mahdavi-Damghani, A. 2007. Organic Farming in Iran: Opportunities and Challenges of Certification, Education and Development, Tropentag Congress on utilization of diversity in land use systems: Sustainable and organic approaches to meet human needs, October 9-11, Witzenhausen, Germany.
- 24 Khaledi, M., and Weseen, S. 2007. Farmers' attitude towards barriers and incentives for converting to organic agriculture, Second National congress on Ecological agriculture, 17-18 October 2007, Gorgan, Iran.
- 25 Sharifi, O., Sadati, S., Rostami Ghobadi, F., Sadati, A., Mohamadi, Y., and Tolou Del, P. 2010. Barriers to conversion to organic farming: A case study in Babol County in Iran. *African Journal of Agricultural Research* 5(16):2260-2267.
- 26 Bello. W.B. 2008. Problems and prospect of organic farming in developing countries. *Ethiopian Journal of Environmental Studies and Management* 1(1):36-43.

- 27 Javanmard, M., and Mahmoudi, H. 2008. A SWOT Analysis of organic dried fig production in Iran. *Environmental Sciences* 6(1):101-110.
- 28 Keshavarz, F., Allahyari, M.S., Azarmi Sesari Z., and Khayati, M. 2010. Factors influencing the adoption of high-yielding rice varieties among farmers in Gilan Province, The 3rd congress on Agricultural and Natural Resources Extension and Education, 2-3 March 2010, Mashhad, Iran.
- 29 Moradi, Z., Heydari, H., Azizi, M., and Yaqubi, A. 2011. Analysis of organic farming as a place sustainable agricultural development platform perspective: case study of Qorveh and Divanadrreh, Kordestan Province, The 2nd national conference on Sustainable Rural Development, Avicenna University, 6-7 July, Hamedan, Iran.
- 30 Asghar-Nejad A. and Tahmaseb-pour, B. 2011. The process of converting conventional agriculture to sustainable agriculture and influencing factors, The first congress on Agricultural Development in North western provinces of Iran, 9,10 November, Ardebil, Iran.
- 31 Hasheminejad, A., and Rezvanfar, A. 2010. Investigating problems and barriers of organic agriculture from organic farmers' point of view in Ravansar, Kermanshah. The first Iranian Fertilizer Challenge Congress: Half a Century of the Fertilizer Consumption, 1-3 March, Water and Soil Research Institute, Tehran, Iran.
- 32 Sari, M.B.A., Asadi, A., Akbari, M., Fakharzadeh, S.A., and Sukhtanloo, M. 2008. A study on the attitude and the influencing factors on adopting organic agriculture. *Journal of Iran Agricultural Economy and Development* 39(1):133-144.

- 33 Akbari, M., Sari, M.B., Fakharzadeh, A.H., Iravani, Alam-beigi, A., and Namdar, R. 2008. A study on farmers' attitude towards influencing factors on consumption of organic products, *Journal of Crops Improvement* 10(2):13-26.
- 34 Osku, T., Chizari, M., and Rasuli, F. 2007. The impact of FFS approach on the knowledge and attitude of rice farmers about biologic management of pests, case study: Mazandaran Province. *Journal of Iran Agricultural Science* 38-2(1):109-119.
- 35 Wossink, A., and Kuminoff, N.V. 2005. Valuing the option to switch to organic farming: an application to U.S. corn and soybeans, Presented at the XIth European Association of Agricultural Economists Congress, Copenhagen, Denmark, August 24-27.
- 36 Taylor, A. 2006. Overview of the current state of organic agriculture in Kenya, Uganda and the United Republic of Tanzania and the opportunities for regional harmonization, UNEP-UNCTAD Capacity-building Task Force on Trade, Environment and Development, Switzerland. Available from: http://www.unep.ch/etb/pdf/cbtfOA_study_text.pdf.
- 37 Foruzani, M., and Shahvali, M. 2010. Investigating religious attitude of rural people towards water management in Fars Province, The 3rd congress on Agricultural and Natural Resources Extension and Education, 2-3 March 2010, Mashhad, Iran.
- 38 Ghane, F., Namdar, R., and Chizari, M. 2009. Assessing the effectiveness of IPM training courses from cotton farmers' perspective in Garamsar county. *Journal of Agricultural Education Management Research* 3(8):59-67.

- 39 Genius, M., Pantzios, X., and Tzouvelekas, V. 2006. Information Acquisition and Adoption of Organic Farming Practices in Crete, Greece. *Journal of Agricultural and Resource Economics* 31(1):93-113.
- 40 Dinpanah G., Mirdamadi, SM., Chizari, M., and Slack, SM. 2009. Analysis of FFS influence on paddy farmers in Sari county. *Journal of Iranian Economic Research and Rural Development* 40(1):75-84.
- 41 Kunihiro, E. 2009. Mainstreaming Gender in Organic Agriculture; A Means to an End. Available from:
http://www.ifoam.org/about_ifoam/around_world/aosc_pages/pdf/Northern-Uganda-Organic-Shea-Project.pdf.
- 42 Nazarian, M., Ajili A., and Rezaee-Moghaddam, K. 2010. Knowledge and attitude of vegetable growers in Shush county towards using pesticides, The 3rd congress on Agricultural and Natural Resources Extension and Education, 2-3 March 2010, Mashhad, Iran.
- 43 IFOAM. 2007. Organic Agriculture and Gender Equality. Available from:
http://www.ifoam.org/growing_organic/3_advocacy_lobbying/eng_leaflet_PDF/OA_Gender.pdf.
- 44 Kang, B. 2007. Women Lead the Way Back to Organic Farming, Retrieved from web:
http://www.ifoam.org/growing_organic/1_arguments_for_oa/social_justice/women_lead_the_way.html.
- 45 Omani, A.R., and Chizari, M. 2011. Identifying the appropriate model for anticipating adoption model for sustainable management of water resources among wheat farmers of Ahvaz Province. *Journal of Agricultural Economy and Development* 19(73):77-100.

- 46 Kassie, M., Zikhali, P., Manjur K., and Edwards, S. 2009. Adoption of Organic Farming Techniques Evidence from a Semi-Arid Region of Ethiopia, Environment for Development Discussion Paper Series January 2009, Retrieved from web: <http://www.rff.org/rff/documents/efd-dp-09-01.pdf>.
- 47 Behrad-Fard, A., and Farzanian, M. 2010. Agricultural extension and knowledge management in agriculture sector emphasizing the synergy between traditional and modern knowledge in AIS systems, The 3rd congress on Agricultural and Natural Resources Extension and Education, 2-3 March 2010, Mashhad, Iran.
- 48 Sofia, P.K., Prasad, R., and Vijay, V.K. 2006. Organic farming-tradition reinvented. Indian Journal of Traditional Knowledge 5(1):139-142.
- 49 IFOAM. 2006. The IFOAM Norms for organic production and processing, Version 2005, IFOAM, Germany.
- 50 IFAD. 2003. The adoption of Organic Agriculture among small farmers in Latin America and the Caribbean. Available from: http://www.ifad.org/evaluation/public_html/eksyst/doc/agreement/pl/organic.htm.
- 51 Ghorbani, M., Liaghati, H., and Nemati, F. 2011. Factors influencing the potential demand for credit by farmers on their tendency for producing greenhouse organic cucumbers in Khorasan Razavi Province. Environmental Sciences, 8(3):35-46.
- 52 Ghorbani, M., Koocheki, A., and Mahmoudi, H. 2009. Estimation of virtual yield organic wheat: Case study of Khorasan Province. Environmental Sciences 6(3): 23-30.

- 53 Pornpratansombat, P., Bauer, B., and Boland, H. 2011. The Adoption of Organic Rice Farming in North-eastern Thailand. *Journal of Organic Systems*, 6(3):4-12.
- 54 Baumüller, H. 2012. Facilitating agricultural technology adoption among the poor: The role of service delivery through mobile phones. ZEF Working Paper Series No. 93. Bonn: Center for Development Research, University of Bonn.
- 55 Shah-Morad, L., and Hayati, D. 2010. FFS approach, considering the Fars Province Experience, The 3rd congress on Agricultural and Natural Resources Extension and Education, 2-3 March 2010, Mashhad, Iran.
- 56 Nemati, A., and Azami, M. 2011. Factors influencing sustainability of potato farming in Bahar County, Hamedan, The 2nd national conference on Sustainable Rural Development, Avicenna University, 6-7 July, Hamedan, Iran.
- 57 Khatoonabadi, A. 2005. A Survey on Some Aspects of Agricultural Extension Privatization in Isfahan Province from the Viewpoint of Extension Officers. *Journal of Water and Soil Sciences*, Isfahan University of Technology 9(1):41-60.
- 58 Azadi, H., Hosseini, G.H., Zarafshani, K., Heydari, A., and Witlox, F. 2010. Factors influencing the success of animal husbandry cooperatives: A case study in Southwest Iran. *Journal of Agriculture and Rural Development in the Tropics and Subtropics* 11(2):89-99.
- 59 Kalogeras, N., Kalaitzis, P., and Van Dijk, G. 2005. Cooperative Strategic Behaviour in Organic Food Markets: A Note,” In: *Food Quality Products in the Advent of the 21st Century: Production, Demand and Public Policy*, eds. K. Mattas & E. Tsakiridou *Cahiers Options Méditerranéennes*, CIHEAM-IAMC Pub., 164:115-128.

- 60 Karamidehkordi, E., and Hashemi, A. 2010. Farmers' Knowledge of Integrated Pest Management: A Case Study in the Zanjan Province in Iran. Innovation and Sustainable Development in Agriculture and Food symposium (ISDA 2010), 28 June - 1 July 2010, Montpellier, France.
- 61 Mahmoudi, H., Mahdavi Damghani, A.M., and Liaghati, H. 2008. An Introduction to Organic Agriculture. Tehran: Jihad-Daneshgahi Press.
- 62 Nieberg, H., and Kuhnert, H. 2007. Support policy for organic farming in Germany, *Landbauforschung Völkenrode* 57:95-106.
- 63 Mahboubi, M.R., and Keshnizi, M. 2010. Comparative analysis of rural women and men's dedication to soil conservation ethnics, case study: Safi-Abad Golestan Province, The 3rd congress on Agricultural and Natural Resources Extension and Education, 2-3 March 2010, Mashhad, Iran.
- 64 Bagheri, A., and Shahpasand, M.R. 2010. Investigating potato farmers' attitude in Ardebil plain towards sustainable agriculture practices. *Journal of Iran Agricultural Economy and Development* 2(41):231-242.
- 65 Karthikeyan, C., Veeraragavathatha, D., Karpagam, D. and Ayisha Firdouse, S. 2009. Traditional storage practices, *Indian Journal of Traditional Knowledge* 8(4):564-568.
- 66 Iliopoulou, D., Douma, K., and Giourga, C. 2011. Motives and barriers to development of organic olive production. In: Migliorini, Paola; Minotou, Charikleia; Lusic, Drazen; Hashem, Yousry and Martinis, Aristotelis, eds. Book of Abstract. International conference on Organic Agriculture and Agro-Eco Tourism in the Mediterranean, DIO, 16-18th September, 2011.
- 67 Schoonbeek, S., Azadi, H., Mahmoudi, H., Derudder, B., De Maeyer, P., Witlox, F. In press. Organic agriculture and undernourishment in developing countries:

Main potentials and challenges. *Critical Reviews in Food Science and Nutrition*.
DOI: 10.1080/10408398.2011.573886.

- 68 Scialabba, N. 2000. Factors influencing organic agriculture policies with a focus on developing countries, IFOAM 2000 Scientific Conference, Basel, Switzerland, 28-31 August 2000.
- 69 Pornpratansombat, P., Bauer B., and Boland, H.2011. The adoption of organic rice farming in Northeastern Thailand. *Journal of Organic Systems* 6(3):4-12.
- 70 Azadi, H. and Filson, G. 2009. Comparative study of agricultural extension systems: A systemic view. *Outlook on Agriculture* 38(4):337-347.
- 71 Kummer, S., Aigelsperger, L., Milestad, R., Chowdhury, A.H., and Vogl, C.R. 2010. Knowledge systems, innovations and social learning in organic farming – An overview Social innovation in organic farming, 9th European IFSA Symposium, 4-7 July 2010, Vienna (Austria).
- 72 Esmaili, B. 2010. The necessity of insurance services in Iran, considering the vulnerability of Iran to climate changes. *Insurance World News Bulletin* 148-149:4-13.
- 73 Abdollahi, S. 2008. A study on organic agriculture development in Iran, Ministry of Agriculture, Agricultural research Institute, Tehran.
- 74 Yaghubi, J., and Naseri, A. 2010. Investigating the mechanisms for supporting organic farmers in Iran, The first national conference on sustainable agriculture and healthy products, Isfahan, Iran.
- 75 Vairo, D., Haring, A.M., Dabbert, S., and Zanolli, R. 2006. Policies supporting organic food and farming in the EU: assessment and development by stakeholders in 11 European countries. Paper presentation at the 98th EAAE

Seminar; Marketing Dynamics within the Global Trading System: New Perspectives; Greece, 29 June-2 July.