Vegetable Farmers' Attitudes Toward Green Agriculture

Samar Shawaqfeh[1*] and Mohammad AlTarawneh[2]

[1*] Department of Plant Production and Protection, Faculty of Agriculture, Jerash University, Jerash, Jordan.

[2] Department of Agricultural Economics and Extension, Faculty of Agriculture, Jerash University, Jordan.

Abstract:

This study aimed to investigate knowledge and attitude toward green agriculture for vegetables farmers in Ghor el Safi area, which is considered the prime area of interest for growing vegetables in Jordan Valley. Questioners were distributed to 316 farmers; multi-level regression analysis was used for measuring the impact of the independent variables on the related variable factors. The result showed that farmer's general attitude towards green agriculture was moderate, where more than two-thirds of the farmer's supported the transition towards using green agriculture. Results showed positive correlation between age, experience, cultivated area, family labor, production quantity, annual income, education, and the level of farmers' knowledge and attitude toward using the green agriculture at the confident level of 0.01 and 0.05. Based on the results, more attention needs to be taken into consideration from decision-makers regarding the necessity of activating the role of agricultural extension in the field to promote green agriculture among farmers, markets for green products need to be created, and more projects to support green agriculture is needed.

Key Words: Green farming, sustainable agriculture, vegetables production, Jordan

Introduction:

Agriculture in Jordan is considered one of the pillars for development in both economic and social aspect. In the past four decades, it also become a pillar of development in its environmental aspect as well, including the preservation of biodiversity and environmental balance that guarantees the sustainability of resources, preserves the rights for future generations. Jordan just like many countries, including developed ones, they don't look at the direct economic dimension of agriculture only, but rather at the social and environmental aspects of agricultural development and their connection with the economic dimension.

The area of Jordan is about 89.3 thousand square kilometers, including the Dead Sea, it is divided into three main geographic and climatic regions: the Jordan Valley, the highlands and the eastern desert. The Jordan Valley considered the most fertile part in Jordan. In winter The Jordan Valley is warmer than the rest of the regions in Jordan, therefore, early production of vegetables and fruits is a plus. (Ministry of Agriculture, 2020).

It is well known that the use of chemicals and growth hormones can increase agricultural production, but also can impact the environment negatively by increasing the levels of pollution. Therefore, production method to reduces pollution rates, preserves the environment and maintain its sustainability, while achieving human food and health security is required. (Al-Tarawneh, 2016). The goal of sustainable agriculture is to meet the society food needs without compromising future generations available resources. In Europe organic farming is a particularly important area of sustainable agricultural activity. (Wrzaszcz, 2023)

Using innovative technologies and practices are promising and effective ideas that allows the transfer of wasted resources and invested resources into new opportunities to generate revenues, improve means of income and ensure the sustainability of resources (Abu Siny et al., 2022). Green technologies contribute to higher efficiency of resources use, benefiting from renewable resources, and preserving non-renewable resources (Chuang et al., 2020). Smart technologies also can be used in green farming to monitor and evaluate crop production in addition to control pesticides application quickly and safely (Voutos et al, 2019). Green technologies involved in supporting and enhancing economic growth, reducing production costs, in addition to addressing challenges such as water scarcity, combating air pollution, and negative environmental agricultural practices. (ESCWA, 2019).

The reason for the rush towards green agriculture is the desire of consumers to obtain safe and clean food free of chemical residues, as many countries of the world have moved towards implementing an agricultural system called organic agriculture, which is one of the oldest agricultural patterns on earth before the advent of chemical fertilizers, such as: ammonium nitrate, which It was left over from the weapons of World War II (Altarawneh, 2013).it is known that using organic agriculture can enhances the integrity of the agricultural ecosystem, including; Biodiversity, biological cycles, and biological activity in the soil. This system focuses on the use of management methods rather than the use of production inputs from manufactured chemicals, taking into account regional conditions that require systems adapted to local conditions (Mondal et al, 2014; Altarawneh, 2016).

Experts in green agriculture are highlighting the role of this new technologies to preserve the environment and to protect human health, while achieving the best production and ensuring the sustainability of these elements for generations. (Lampkin, 1990). Green Agricultural depend on the nature of agricultural practices in countries where food products are coming from (Hall and Dorai, 2011).

With the increasing interest in green farming around the world, research on farmers attitude toward adopting green farming in Jordan have not been conducted so far. The main objective of the study is to evaluate vegetables farmers' attitudes towards the transition to green agriculture. The specific objectives were to determine farmers'knowledge about green agriculture, determine farmers' sources of agricultural information, and determine vegetable farmers' attitudes towards green agriculture.

Methodology:

This study was conducted in Deir Alla - in the Central Jordan Valley / Balqa Governorate. Sample size was determined by Kreijcie and Morgan Law (1970). Questionnaires was developed

and validated by expert, and then it was distributed among 500 vegetable farmers; a random sample was drawn at a confidence level of 0.95 by De Morgan's law (217 vegetables farmers). Secondary data were also collected from various refereed scientific journals, books and the Internet, which formed the support of literature for analysis and suggestions. A questionnaire was also developed to achieve the objectives of the study. All data were compiled using Microsoft Excel 2010 [Microsoft Ltd., USA] and data were analyzed using SPSS 20.0 version [IBS Ltd., USA]. The statistical significance was fixed at a p-value < 0.05.

Results and discussion:

Socio-demographic characteristics

In Table 1, the descriptive analysis of the demographic characteristics of the respondents showed that 71% were over 50 years old, and (20%) were in the age group between 35-50 years and this age group consider the active young farmers who are willing to accept new ideas and innovations. These results indicates that majority of farmers were from the upper young people, who has more experience and knowledge in agriculture, this age group considered the as the appropriate time for decision-making. The age mean of the respondents is about 42.56 and the standard deviation was about 8.18-degree years. Regarding respondents' level of education. The results also indicate that more than two-thirds of the study sample size (61%) are from the post-secondary level.

The results showed that about (64%) of the study sample have sufficient experience in the field of vegetable cultivation for more than 16 years; this indicates the existence of vegetable cultivation in the study area for a long time. The results showed that 47% of the study sample use agriculture land ranging between 10 dunums and 20 dunums to grow vegetables. The results also showed that about (62%) of the study sample hire less than 4 workers in their farms. In regard of vegetables production, the results showed that more than (46%) produce more than 16 tons during one season. The results also showed that (55%) of the study sample had an annual income from the activity of growing vegetables between 1500-3000 dinars during one season.

Table (1) Economic and Social Characteristics of the Study Sample

Socio-demographic Variables	Category	No. of Participants (n)	Percentage (%)
Age (years)	Less than 35	20	9
	35-50	43	20
	More than 50	154	71
Educational level	Can't read or write	8	4
	Can read and write	12	6
	Primary level	65	30
	Secondary Level	54	25
	Bachelor's degree)	78	36
Experience in Agriculture (years)	Less than 5	15	7
	5-10	25	12
	11-16	39	18

	More than 16	**138**	**64**
Cultivated area (dunum)	**Less than 10**	**85**	**39**
	10-20	**101**	**47**
	More than 20	**31**	**14**
Hired Labor	**Less than 4 workers**	**134**	**62**
	4-8 workers	**51**	**24**
	More than 8 workers	**32**	**15**
Production Quantity (tons/season)	**Less than 5**	**100**	**46**
	5-10	**32**	**15**
	11-16	**38**	**18**
	More than 16	**47**	**22**
	Less than 1500	**100**	**46**
Income (Dinar/season)	**1500-3000**	**32**	**15**
	3001-4500	**38**	**18**
	More than 4501	**47**	**22**

Farmer's knowledge toward Green-Agriculture

Table (2) shows that vegetable farmers had medium level of knowledge toward green agriculture, the average farmer perception and knowledge toward green agriculture was 2.26, with a standard deviation of 0.43. The results show that green agriculture improves soil properties came in first place, followed by that green agriculture requires experience, and then came the possibility of using chemical pesticides at critical stages in green agriculture, and it was in fourth place that green agriculture needs a higher cost than traditional agriculture, and that green agriculture requires the availability of high-quality seed varieties. The contribution of green agriculture significantly reduces the risk of groundwater pollution, and reduce the effects of global warming. Finally, the governmental support for farmers who adopt green agriculture came in last place.

Table (2): Levels of Farmer's knowledge on Green Agriculture

#	Order	Paragraph	Levels						Mean	Standard deviation	p-value	Level
			High		Medium		Low					
			N	%	N	%	N	%				
1	6	Green agriculture significantly reduces the risk of groundwater pollution	175	80.6	35	16.1	7	3.3	2.60	0.69	0.032	High

2	1	Green Agriculture improve soil properties	115	53	87	40	15	7	2.57	0.74	0.000	High
3	7	Green Agriculture reduces greenhouse effects	110	50.7	75	34.5	32	14.8	2.46	0.72	0.002	High
4	2	Green Agriculture need high Experience	78	36	49	23	94	43	2.44	0.75	0.001	High
5	3	Pesticide use is allowed in critical cases	35	16	57	26	125	58	2.25	0.75	0.004	Medium
6	4	Green Agriculture more expensive than traditional agriculture	125	58	85	39	7	3	2.17	0.74	0.042	Medium
7	5	Green agriculture requires high quality seed varieties	135	62	68	31	14	6	1.98	0.75	0.046	Medium
8	8	government provide support to farmers who adopt green agriculture	25	11.5	30	13.8	162	74.7	1.84	0.63	0.049	Medium
		Overall Average							2.26	0.43	0.001	Medium

Based on the results from this study as shown in Table (2), it is obvious that some farmers have limited knowledge on the principles of applying organic agriculture for vegetable cultivation, while other farmers do not have that knowledge, which constitutes an obstacle to use this technology. This can be due to the weakness of extension services provided in this field, or that the extension services provided by agricultural extension workers were not enough to convince them to adopt the organic farming technique, the results from this study were similar to that reported by (Szumigalki and Van Acker, 2005).

Farmers' Attitudes toward Green Agriculture:

Results in Table (3) shows farmers' attitude and perception toward green agricultural use in vegetable cultivation. Farmers attitude and perception score was high 3.74, with a standard deviation of 0.43, which indicates the extent of farmers' interest in environmentally safe agricultural issues, such as: organic farming, that can reduce pollution resulting from waste generated during different agricultural processes.

Results in Table (3) showed that farmers response to the survey statements vary, most of the statements were approved at (very high) level, for example paragraph (8): "The use of pesticides leads to soil pollution, and reduces its fertility" got a score of 4.37, with a standard deviation of 0.74, and that indicates a dispersion in the respondents' answers. Farmer's conviction that chemical pesticides have a negative impact on living organisms, more than half of the study sample agreed on the existence of negative effects of pesticides on living organisms, although farmers still use it to maintain higher production. Even though, farmers are aware of the negative effects of pesticides on living organisms, the economic and profit side, in addition to the desire to aaccelerate in the production process always is dominating the farmers decision.

About 49.7% of the farmers believe that organic agriculture enhances soil texture and increase soil nutrients retention and with a score of 4.29, and standard deviation of 0.78, it is clear that farmers' attitude towards the role of organic agriculture on ameliorating soil properties and enhancing the activity of soil organisms is positive.

Taking into consideration the measures to protect organic agricultural products, the results was 3.08, for the mean and a standard deviation of 0.81. farmers showed their worried toward shifting from traditional agriculture to green agriculture, and their prominent demands was to provide a concise, clear measure to protect green agriculture products.

When farmers were questioned about governmental support for green agriculture, the results showed very high attitude toward shifting from traditional agriculture to green agriculture, about 40% of the farmers showed positive attitude to switch if governmental support was guaranteed, especially that farmers know that organic agriculture provide a higher profit than traditional agriculture. About 40% of the study sample showed low acceptance to switch toward organic production, because of the process to issue legal licenses and the certification requirements, this response clearly reflects the weak farmers' knowledge that marketing organic products needs a certificate of origin as responses from paragraph #11.

The responses from farmers regarding the high prices of organic products compared to consumer income, showed poor knowledge and that can be because of the lack of organic farms in their region, and poor knowledge of prices. The results in Table (13) showed a significant difference between the farmers' answers at a level of significance less than or equal to 0.05.

This low trend towards many paragraphs of the questionnaire on farmers' attitudes towards green agriculture can be attributed to the weakness and inadequacy of agricultural extension services in disseminating and transferring modern agricultural methods, educating farmers about the importance of green agriculture, the negative effects of traditional agriculture on the health of beneficial soil organisms, the effects of chemical pesticides and fertilizers on groundwater, and their repercussions on consumer health.

The effect of cultivated area on vegetable farmers' attitudes towards green agriculture:

The results in table (4) shows the effect of the cultivated area on vegetable farmer's attitudes levels towards green agriculture. About 49 farmers, from those who cultivate 10 to 20 dunums, were found to be highly interested towards green farming**.** As shown in Table (5) the results showed calculated value for chi-square of 10.27 and the tabular value at 95% confidence level for 4 degrees of freedom is 9.49, so the calculated value is greater than the tabular value, so that conclude rejection to accept the null hypothesis; that there is no significant effect of area on farmers' attitude towards green agriculture, and accepting the alternative hypothesis that confirms the existence of a significant effect of cultivated area on farmers' attitudes towards green agriculture.

Table (3): Farmer's Attitude toward Green Agriculture

Order	Paragraph	Attitude Levels										Mean	Standard deviation	p-value	Level
		Very High		High		Neutral		Low		Very Low					
		N	%	N	%	N	%	N	%	N	%				
8	Pesticide use contaminates the soil and reduces its fertility	176	55.7	46	14.6	54	17.1	27	8.5	13	4.1	4.37	0.74	0.000	High
7	Green farming enhances soil texture, and improve soil nutrients retention	157	49.7	76	24.1	61	19.3	9	2.8	13	4.1	4.29	0.78	0.000	High
6	Green agriculture reduces the risk of groundwater pollution	128	40.5	73	23.1	82	25.9	22	7.0	11	3.5	4.15	0.81	0.000	High
1	Green Agriculture improve soil properties	90	28.5	143	45.5	64	20.3	10	3.2	9	2.8	4.10	0.91	0.000	High
3	Green Agriculture does not cause damage and does not leave harmful residues in the soil	116	36.7	69	21.8	106	33.5	12	3.8	13	4.1	4.08	0.71	0.000	High

2	Green farming increases water conservation	110	34.8	78	24.7	110	34.8	8	2.5	10	3.2	4.04	0.87	0.000	High
5	Green agriculture preserves soil organisms	111	35.1	82	25.9	92	29.1	14	4.4	17	5.4	4.02	0.86	0.000	High
8	Fertilizers used in green cultivation do not adversely affect human health	94	29.7	70	22.2	115	36.4	15	4.7	22	7.0	3.93	1.159	0.000	High
14	government provide support to farmers who adopt green agriculture	138	43.7	32	10.1	50	15.8	96	30.4	0	0	3.67	0.98	0.021	High
18	Green Agriculture more expensive than traditional agriculture	122	38.6	49	15.5	66	20.9	79	25.0	0	0	3.67	0.83	0.010	High
19	Green agriculture gives higher profit than traditional agriculture	126	39.9	43	13.6	64	20.3	83	26.3	0	0	3.67	0.85	0.015	High
17	Green agriculture reduces production cost	122	38.6	53	16.8	43	13.6	98	31.0	0	0	3.62	1.27	0.072	Medium
10	Reducing tillage, and introducing nitrogen-fixing leguminous crops into the crop cycle leads to carbon return to the soil.	59	18.7	140	44.3	53	16.8	64	20.3	0	0	3.61	0.95	0.000	Medium
20	Prices for organic and non-organic products are the same	106	33.5	47	14.9	82	25.9	81	25.6	0	0	3.56	1.23	0.343	Medium
13	Consumers can easily buy green agricultural products from the farm	124	39.2	44	13.9	17	5.4	131	41.5	0	0	3.50	1.36	0.902	Medium
21	Green farming reduce cost of fertilizer and family work	89	28.2	45	14.2	100	31.6	82	25.9	0	0	3.44	1.19	0.408	Medium
9	Green farming reduces	87	27.5	59	18.7	45	14.2	106	33.5	19	6.0	3.43	0.76	0.004	Medium

	greenhouse effects														
11	Organic production requires licenses and certification	67	21.2	48	15.2	86	27.2	111	35.1	4	1.3	3.22	0.97	0.000	Medium
16	High prices for organic products compared to consumer income.	87	27.5	31	9.8	60	19.0	138	43.7	0	0	3.21	0.92	0.000	Medium
12	Consumers tend to buy more green agricultural products than traditional agricultural products	67	21.2	51	16.1	60	19.0	138	43.7	0	0	3.14	0.74	0.000	Medium
15	Activating measures to protect green agricultural products	66	20.9	30	9.5	78	24.7	137	43.4	5	1.6	3.08	0.81	0.000	Medium
	Overall Average											3.74	0.43	0.000	High

Table (4): The effect of cultivated area on vegetable farmers' attitudes towards green agriculture:

Cultivated Area (Dunum)	Attitude Levels			Total
	High	Medium	Low	
Less than 10	28	11	0	39
10-20	49	38	0	87
More than 20	38	44	9	91
Total	115	93	9	217

Source: Field survey results, 2022.

Table (5): Chi-Square Value for cultivated area on vegetable farmers' attitudes towards green agriculture:

Observed frequency	Expected frequency	$(O - E)^2$	$(O - E)^2 / E$
28	30	4	0.13
49	35	196	5.60
39	51	144	2.82
11	10	1	0.10
38	45	49	1.09
44	37	36	0.97
0	0	0	-
0	0	0	-
9	9	0	-
Total			10.72

The effect of experience on vegetable farmers' attitudes towards green agriculture:

The results in table (6) shows the effect of farmers experience on their attitudes towards green agriculture. It was found that 69 farmers with experience less than 5 years had a high attitude towards green agriculture, followed by those with experience ranged between 5 and 10 years.

Table (6): The effect of cultivated area on vegetable farmers' attitudes towards green agriculture:

Farmers' Experience (years)	Attitude Levels			Total
	High	Medium	Low	
Less than 5	69	25	0	94
5 - 10	35	15	3	53
11-16	15	25	2	42
More than 16	6	19	3	28
Total	125	84	8	217

Source: Field survey results, 2022.

As shown in Table (7) the results showed calculated value for chi-square of 24.18 and the tabular value at 95% confidence level for 6 degrees of freedom is 12.59, so the calculated value

is greater than the tabular value, so that conclude rejection to accept the null hypothesis; that there is no significant effect of area on farmers' attitude towards green agriculture, and accepting the alternative hypothesis that confirms the existence of a significant effect of cultivated area on farmers' attitudes towards green agriculture.

Table (7): Chi-Square Value for Experience on vegetable farmers' attitudes towards green agriculture:

Observed frequency	Expected frequency	(O - E)2	(O - E)2 / E
69	75	36	0.48
35	40	25	0.63
15	19	16	0.84
6	3	9	3.00
25	18	49	2.72
15	17	4	0.24
25	12	169	14.08
19	16	9	0.56
0	7	49	-
3	5	4	0.80
2	3	1	0.33
3	2	1	0.50
Total			24.18

The effect of age on vegetable farmers' attitudes towards green agriculture:

The results in table (8) shows the effect of age on vegetable farmers attitudes towards green agriculture. It was found that 79 farmers with age younger than 35 years had a high attitude towards green agriculture, followed by those with age ranged between 35 and 50 years.

Table (8): The effect of age on vegetable farmers' attitudes towards green agriculture:

Farmers' Age (years)	Attitude Levels			Total
	High	Medium	Low	
Younger than 35	79	31	12	122
35-50	32	12	6	50
Older than 50	19	21	5	45
Total	130	64	23	217

Source: Field survey results, 2022.

As shown in Table (9) the results showed calculated value for chi-square of 24.01 and the tabular value at 95% confidence level for 4 degrees of freedom is 9.49, so the calculated value is greater than the tabular value, so that conclude rejection to accept the null hypothesis; that there is no significant effect of area on farmers' attitude towards green agriculture, and accepting the alternative hypothesis that confirms the existence of a significant effect of cultivated area on farmers' attitudes towards green agriculture.

Table (9): Chi-Square Value for Age on vegetable farmers' attitudes towards green agriculture:

Observed frequency	Expected frequency	$(O - E)^2$	$(O - E)^2 / E$
79	83	16	0.19
32	40	64	1.60
19	16	9	0.56
31	36	25	0.69
12	14	4	0.29
21	12	81	6.75
12	5	49	9.80
6	3	9	3.00
5	8	9	1.13
Total			24.01

Discussion:

The average age of the farmers was 46.25 years, and their ages ranged between 35 - 50 years, and this indicates that the category of farmers who built their organic farms, were from young people with experience and knowledge in agriculture, this age category is the appropriate age for

decision-making. By comparing this result with previous literature and previous studies, Yamin, 2023 reported that young entrepreneurs whose ages ranged between 25 and 30 years worked on organic farms, and this indicates that the socio- economic status, and the nature of the region affect the decisions of the individuals who live in it. According to the fact that Jordan is a developing country, entrepreneurs are trying to study the percentage of risk when developing a feasibility study for any project, and according to studies that indicate that organic farming is costly and requires manpower, which was a reason for entrepreneurs' reluctance to engage in the adventure of organic farming. (Klerkx et al., 2019). This study showed that 31% of farmers have university degree, and 69% have secondary education level or less, and this contradicts what came out of a study (Adamchak, 2023), which confirmed that there is a positive correlation between the educational level variable and those coming to organic agriculture, where the higher the educational level, the greater the desire to experience organic agriculture. Also, it was reported that adoption of new farming technologies requires more years of education and knowledge (Pivoto et al., 2019). The results from the current study may indicates that in Jordan it is more associated with work experience than education, the percentage of farmers without a university degree are higher than farmers with higher education, and therefore this this percentage affected the results of the study in favor of farmers without a university degree.

The average for farmers experience in this research was 8.59 years, and this is related to age, as it is clear that the age of farmers is commensurate with the number of years of experience, and this is an indicator that Jordan is still a soft branch practicing organic or green agriculture, despite the fact that farmers know about organic and green farming for more than 25 years (Tarawneh, 2016).

This study showed that 50% of farmers own their farms land, and therefore the cost of rent decreased and the profit rate increased, and due to personal variables, such as age and experience, about 50% of farmers were not able to own land, so right to make decision will be shared between the land owner and green farm owner, and this is an indication that there is still fear among farmers of embarking on changing their farms to become green-farm (Azam, 2015).

The results showed that more than half of the farmers cultivate more than 20 dunums for organic vegetable cultivation, and the average farm size was 19.54 dunums, with a standard deviation of 4.39 dunums, from traditional farms, and therefore as an indicator of sustainable development, the more organically cultivated area, the greater the chance of sustainable agricultural development (FAO, 2019), but, area alone cannot be considered an effective indicator because it was more associated with the number of farmers who adopt organic farming compared to the total number of farms in the Jordan Valley region. It is noted from the results that about 3-6 farmer family members' work in the farm as organic farms need more labor and that will increase the cost on farmers, therefore using labor from the family reduces the operational costs of the farm. Although farmers use their family members to work in the farm, they still need more hired labor which account for approximately 4-8 persons in each farm.

The average income from organic agriculture during one season is about 3798 dinars, and this is an indicator that this type of agriculture is not considered high in profit compared to the traditional agriculture, and that can be due to the high operational cost, in addition to the small

size for existing farms that still need operational costs. In this study two-thirds of the farms are originally traditional ongoing farms, while one-third are farms shifting from traditional agriculture to organic and green farming. Farmers' knowledge of the sustainable agricultural development indicators was high with a score of 4.02, and a standard deviation of 0.4 which indicates that farmers are interested in environmentally safe agricultural issues, Santiteerakul et al, 2020 also reported that green agriculture can reduce pollution resulting from traditional agricultural residues.

Farmers with more knowledge about green farming more likely to adopt the new farming technologies when compared to farmers with less knowledge of green farming. (Ume et al., 2023). Farmers experience due to the educational level, and their awareness of the importance of green agriculture as a way to eliminate poverty and unemployment, and to preserve the environment are clear indicators in sustainable agricultural development. (Tarawneh, 2016). Farmers' knowledge of the field of using organic fertilization instead of chemical fertilization was manifested, because of their knowledge of the damage caused by chemical fertilization on the soil, thus reducing pollution resulting from agricultural residues, as farmers stressed that it is necessary to use farm waste as a natural fertilizer on the farm. (Azam, 2015).

Conclusions:

This study investigated farmers' attitude towards green agriculture, the results showed that vegetable growers had moderate level of knowledge related to green agriculture in general. The results also showed that the general attitude of farmers towards green agriculture was moderate, as more than two-thirds of the farmers supported the importance of shifting towards the use of green agriculture. The results showed that there is a significant significance of the cultivated area in farmers' attitudes towards green agriculture, and that age and experience do not affect the farmers' attitudes towards implementation green agriculture.

Organic farms managed by the owners of the property themselves are more beneficial to the family because they reduce the unemployment rate of their members and at the same time increase their annual income and thus achieve one of the indicators of sustainable development. Organic farms play a large and clear role in achieving sustainable agricultural development, as they positively affect development goals, especially poverty, unemployment and hunger. In the short term, organic farmers have less income compared to other farmers, but its impact is visible in the long term. For the assurance of succuss and for faster and higher profit the owner of organic farms prefers to start this green farm from scratch and well establish their project for long term productivity compared to switching from traditional farms.

Recommendations:

Based on the results obtained, the following recommendations could be reached:

1- Direct the attention of decision makers to the necessity of activating the role of agricultural extension in the field of spreading the culture of organic agriculture among farmers.

2- Providing markets for selling green products.

3- Support green agriculture projects.

References:

Adamchak, Raoul. "Organic farming". Encyclopedia Britannica, 1 Nov. 2023, https://www.britannica.com/topic/organic-farming. Accessed 13 November 2023.

Altarawneh, Mohammad. 2013. Consumer Awareness towards Organic Food: A Pilot Study in Jordan, J. Agric. Food. Tech., 3(12).

Altarawneh, Mohammad. 2016. Attitudes of vegetable farmers towards organic agriculture in Jordan. Jordan Journal of Agricultural Sciences. 12(1):123-136.

Azam, M. (2015). The influence of socio-demographic factors in adopting organic farming practices. International Journal of Interdisciplinary and Multidisciplinary Studies, 2(5), 8-17. Retrieved from: https://www.ijims.com.

Chuang, J., Jiun-Hao W. and Yu-Chang Liou. (2020). Farmers' Knowledge, Attitude, and Adoption of Smart Agriculture Technology in Taiwan. International Journal of Environmental Research Public Health, 17, 7236.

Economic and Social Commission for Western Asia (ESCWA) (2019). Green technology, innovations and practices in the agricultural sector.

FAO, 2019, Digital technologies in agriculture and rural areas.

Hall, Andy and Dorai, Kumuda. 2011. The greening of agriculture: Agriculture innovation and sustainable growth. Paper prepared for the OECD Synthesis Report on Agriculture and Green Growth.

Klerkx, L., Jakku, E., & Labarthe, P. 2019. A review of social science on digital agriculture, smart farming and agriculture 4.0: New contributions and a future research agenda. NJAS: Wageningen Journal of Life Sciences, 90–91:11–16. https://doi.org/10.1016/j.njas.2019.100315.

Kreijcie and Morgan. 1970, Determining Sample Size for Research Activities. Educational And Psychological Measurement, 30, 607-610.

Lampkin., (1990). Organic Farming, Farming Press, lpswish 701pp.

Mondal, Shimul. Theerachai Haitook and Suchint Simaraks. 2014. Farmers' Knowledge, Attitude and Practice toward Organic Vegetables Cultivation in Northeast Thailand, Kasetsart J. (Soc. sci) 35: 158 – 166.

Ministry of Agriculture, Jordan, 2020. National Agriculture Development Strategies 2020-2025. Amman, Jordan.

Pivoto, D., Barham, B., Waquil, PD, Foguesatto, CR, Corte, VFD, Zhang, D., & Talamini, E. (2019). Factorsinfluencing the adoption of smart farming by Brazilian grain farmers.

International Food and AgribusinessManagement Review, 22(4), 571–588. https://doi.org/10.22434/IFAMR2018.0086.

Santiteerakul, Salinee ., Sopadang, Apichat., Yaibuathet, Korrakot., Tippayawong & Krisana Tamvimol., 2020. "The Role of Smart Technology in Sustainable Agriculture: A Case Study of Wangree Plant Factory," Sustainability, MDPI.

Szumigalki A., and Van Acker, R. 2005. Weed suppression and crop production in annual intercrops. Weed Science, 53 (6): 813- 825.

Ume, C.O., Onah, O.G., Okpukpara, B.C., Chukwuma-Ume, N., Charles, U.I., Omeje, E.E.,Chiemela, C.J., Chituru, I.J., and Orazulike, O., 2023. Factors influencing smallholder adoption of organic agriculture in Southeast geopolitical region of Nigeria. Front. Sustain. Food Syst. 7:1173043. doi: 10.3389/fsufs.2023.1173043.

Voutos, Y., Mylonas, P., Katheniotis, J., & Sofou, A. 2019. A survey on intelligent agricultural information handling methodologies. Sustainability, 11(12), 3278.

Wrzaszcz, W. Tendencies and Perspectives of Organic Farming Development in the EU–the Significance of European Green Deal Strategy. Eur. J. Sustain. Dev. 2023, 12, 143.

Yahia Abu Siny, Mohammad AlTarawneh , and Muad ALKiyyam. 2022. Economic and Environmental Indicators of Sustainable Production in Smart Farms in Jordan. Jordan Journal of Agriculture Sciences. 18(1):169-182. DOI: 10.35516/jjas.v18i2.177.

Yamin, M., Tafarini, M.F., and Andelia, S.R., 2023. The Comparison of Household Economic Level from Conventional to Organic Rubber Farming to support Sustainable Development in Agriculture. BIO Web of Conferences 69 (4): 04009. DOI: 10.1051/bioconf/20236904009.