NEW MEDIT

CIHEAM BARI

MEDITERRANEAN JOURNAL OF ECONOMICS, AGRICULTURE AND ENVIRONMENT

Poste Italiane Spa Spedizione in Abbonamento Postale Periodico ROC Centro Nord aut. N° 0029 - € 15,00.

5
QUARTERLY
VOL. XX - N. 5
DECEMBER
2021

Bononia University Press

ISSN: 1594-5685
www.newmedit.iamb.it

Contents

Role of rural women in organic farming: A case study from Turkey

Damla Özsayin*, Müesser Korkmaz**

DOI: 10.30682/nm2105b
JEL codes : C35, C42, O18, Q18

Abstract

In this study, it was aimed to determine the participation tendencies in organic agriculture activities of women living in rural areas of the northwestern part of Turkey. The data were collected from 183 rural women by simple random sampling method. The survey was conducted from March to May 2020. The data were evaluated by descriptive statistics, a participation index score and multiple regression analysis. According to the results of the participation index score, rural women's participation of in organic farming activities was highest in the fertilizer application stage and the least in the marketing stage. The results of multiple regression analysis showed that there was a statistically significant relationship between the participation level of rural women in organic farming activities and socio-economic characteristics (age, education level, household size, organic farming experience, household income, agricultural land asset and participation in agricultural training programs). As a result, the findings of the study are expected to make significant contributions to rural development, province economy and further emphasizing the importance of rural women in organic farming activities.

Keywords*: Canakkale, Multiple regression, Organic farming, Participation, Rural women*

1. Introduction

Organic agriculture is a production system that is carried out without the use of synthetic chemicals and inorganic fertilizers. This system reduces the risks concerning human, animal and natural resources through maintaining biological diversity (Deepak and Senthil, 2018; Nishi *et al.*, 2019). Organic farming activities that improve by starting from the 1930s in the world, began by a small group of producers in Turkey in 1985 (Turhan *et al.*, 2017). Organic farming practices in Turkey has gained acceleration in terms of the number of producers and production areas since 2008, especially. Organic agriculture activity which was carried out by 14,926 producers on 166,883 hectares in 2008, reached 74,545 producers and 545,870 hectares in 2019 (TURKSTAT, 2019).

Women play an important role in management and use of natural resources. Therefore, women's exclusion from decision making bodies represent a missed opportunity in terms of sustainable management of available resources and economic development (Sisto and Furst, 2019). In Turkey, women living in rural areas take an active role in agricultural production activities as well as housework and childcare. They are

* Çanakkale Onsekiz Mart University: Gökçeada Applied Sciences School, Department of Organic Farming Business Management, Gökçeada-Çanakkale, Turkey.
** Çanakkale Onsekiz Mart University, Gökçeada Applied Sciences School, Department of Gastronomy and Culinary Arts, Gökçeada-Çanakkale, Turkey.
Corresponding author: dozsayin@comu.edu.tr

involved in selecting and improving local plant varieties, seed exchange and management. Also, they grow and collect food, manage and use natural resources to fulfill the daily needs of their household (Sisto and Furst, 2019). Sustainable agriculture techniques (such as organic produce production, rotational grazing) vitalize women in rural areas, and provides spaces of empowerment for them. These techniques emphasize labour intensive work, and the majority of field work (planting, cultivating and harvesting) is performed through hand by the women farmers (Trauger, 2004; Adinolfi et al., 2020). Therefore, organic food production, which is one of the sustainable agriculture techniques, is of great importance in terms of being an alternative income generating tool that can be developed for evaluating the labour force potential of women producers (Korkmaz and Tüfekçi, 2007). With the development of organic agriculture, which is a labour intensive production system, the significance of rural women has also increased in this production activity. Because, women play a significant role from land preparation to post-harvest operations in this production activity (Santhi and Kalirajan, 2019).

Northwest Turkey is an important part of the country with a high potential and variety of agricultural production (TURKSTAT, 2019). Çanakkale province, which is located northwestern part of Turkey, is one of the provinces of Turkey come into prominence in terms of the quantity of agricultural production in certain products (olive and grape) and production value. This province is the second city (like İstanbul) which has lands in both Asia and Europe on Gallipoli Peninsula on the northwest coast of Turkey and Biga Gallipoli, the prolongation of Anatolia (Anonymous, 2019). Çanakkale province, which have an important place in terms of agricultural production and product variety, has also shown itself in organic farming practices. A total of 97 different organic products (primarily olives and grapes) are grown in this province. In Çanakkale province, the organic farming activity which was carried out on 7,290 hectares with 115 producers in 2002, reached 594 producers and 48,877 hectares in 2019. The population of the province dealing with agricultural activities is 180,185 people and its ratio to the total population is 33.2%. The proportion of female population in the total agricultural population is 48.9% (Anonymous, 2019). Therefore, in spreading organic farming activities, it is important to increase tendencies of women towards these production activities and to contribute for their support in this activity area.

In literature, there are many studies on women empowerment in organic farming. However, there is limited literature with regard to women's participation level in organic farming activities and factors affecting their participation level. As there are few studies about this topic, it has been compared the results of this study with those available. Some previous studies indicated that women generally are more likely to adopt natural products and environmentally friendly production techniques in organic farming activities than men (Chiappe and Flora, 1998; Urena *et al.*, 2008; Jansen, 2000). In a study conducted in Zimbabwe, it was found that organic farming was the major source of income for the female farmers (Svotwa *et al.*, 2009). Roy and Mondal (2015) explained that 70% of women in the Samsung district of North-East Thailand had medium and high level of involvement in organic (vegetables) farming. In a study conducted in Odisha India, it was investigated that the effects of organic farming on the empowerment of women and found organic farming had potential to achieve sustainable development not only in better food and nutrition management but also women empowerment (Altenbuchner *et al*., 2017). Karaturhan *et al*. (2018) found that being farmer of rural woman's father's occupation, education level, the number of children in the family, the participation in farming practices, taking part in professional trainings, following development projects oriented in women, being open-minded towards innovations, being of awareness about organic farming and being of own income had an effect on probability of women's adopting organic farming on their family farms. In a study conducted in Bangladesh, it was determined that majority (52.1%) of rural women had medium participation in organic farming activities and this participation was highest in land management while

it was lowest in marketing the product (Nishi *et al.*, 2019). Nath and Athinuwat (2021) found that women had medium level of empowerment in organic farming, and age, education, farming experience were the effective factors on women farmers' empowerment. In this literature review, there were various studies evaluating women's empowerment in organic farming and their participation level in this activity. However, it has not been coming across any studies that examine the participation level of rural women in organic farming activities in Çanakkale province, which has a favorable location for organic agriculture. Also, the number of studies conducted in Turkey about this issue is also very limited. Therefore, this study may be a contribution for both the Turkish and international literature.

This study focused on rural women in order to eliminate the lack of information about the participation tendencies in organic farming activities of women in the study area. In this context, it is thought that the present study will fill a gap regarding this issue in the relevant literature. Therefore, the present study aimed to determine the socio-economic characteristics of women living in rural areas of Çanakkale province and their participation tendencies in organic farming activities. The findings to be obtained from this study are expected to contribute to province economy and the further emphasizing of the importance of rural women in organic farming activities as well as researchers and policymakers.

2. Material and methods

2.1. *The study area and sample size*

The primary material of the present study was composed of answers obtained from interviews with rural women who participated in organic farming activities in Ayvacık, Gökçeada, and Ezine districts of Çanakkale. In choice of Çanakkale province located northwestern part of Turkey in this study, it was taken into consideration features such as being has a strategic importance of this province about organic farming and being of no study that is conducted in the province concerning this study topic. In the determining the total number of farmers who engaged in organic farming in Çanakkale province, 2019 records of Çanakkale Directorate of Provincial Agriculture and Forestry were used (Anonymous, 2019). Ayvacık, Gökçeada, and Ezine districts selected as study areas were districts that best represent Çanakkale province in terms of being of intensive organic farming production in these districts and being actively engaged in women's organic farming activities (Figure 1).

Figure 1 - Map of study area.

Since women have a significant role in organic farming activities like in conventional agriculture, the research population of this study composed of answers obtained from interviews with rural women who participated in organic farming activities. The survey was conducted from March to May 2020. The data were gathered by face-to-face interview technique. In the selection of rural women to be surveyed from the sample population, the land size that is applied organic farming activity was taken into consideration. A simple random sampling method was used to determine the number of rural women participating in organic farming activities (Cochran, 1977).

$$n = \frac{N * \sigma^2 * t^2}{(N-1) * D^2 + \sigma^2 * t^2}, \qquad D = \frac{d^2}{t^2} \quad [1]$$

where, n=number of the women representing the population, N=total number of the farmers in the population (432), σ=standard deviation of the population, d=acceptable error limit in population mean ($\bar{X}$ x 0.05), $\bar{X}$=average land asset (hectares), t=desired confidence level (1.96 for 95%). Thus, the number of rural women to be surveyed was determined as 183 (Table 1).

Table 1 - Sampling size of study.

Province, country	*Selected districts*	*The number of rural women*
Çanakkale, Turkey	Ayvacık	61
	Gökçeada	61
	Ezine	61
Total		183

The survey questions in the current study were prepared inspired from some previous studies conducted about rural women's involvement in organic farming activities (Urena *et al.*, 2008; Jansen, 2000; Svotwa *et al.*, 2009; Roy and Mondal, 2015; Altenbuchner *et al*., 2017; Karaturhan *et al*., 2018; Nishi *et al*., 2019; Nath and Athinuwat, 2021). In the first section of the survey questions, there was information regarding socio-economic characteristics (age, education, household, etc.) of rural women who participated in organic farming activities. In the second section, consumers were asked some questions regarding these practices in order to measure the participation level of rural women in organic farming activities (land, seed, fertilizer, etc.).

2.2. *Data analysis*

Data analysis was performed in three sections. In the first section, descriptive statistics (mean, standard deviation, etc.) were used to determine the socio-economic characteristics of rural women who participated in organic farming activities. In the second section, 6 general aspects, including 20 organic farming activities, were taken into account to measure the participation of rural women in organic farming activities. These activities regarding organic farming practices were prepared with inspiration from some previous studies (Sakiluzzaman *et al.*, 2018; Nasrin *et al.*, 2019; Nishi *et al.*, 2019; Nath and Athinuwat, 2021). Participation level of rural women in organic farming activities were determined according to their participation scores in organic farming activities. Thus, the level of women's participation in organic farming activities were divided into three groups as low participation (≤20), medium participation (21-40), and high participation (≥40). A four-point rating scale that is assigned as 'frequently', 'sometimes', 'rarely' and 'never' was used for 3, 2, 1 and 0 scores, respectively in order to determine the degree of women's participation in organic farming activities. According to this scale, the scores of rural women in these activities was ranged from "0 (0= 0 × 20) to 60 (60= 3 × 20)". The 0 score indicates no women's participation in organic farming activities while the 60 score indicates the highest women's participation in organic farming activities. Also, the score for extent of participation of rural women in each aspect of organic farming activities was ranged from "0 (0= 0 × 183) to 549 (549= 3 × 183)". The "0" score indicates no women's participation in each aspect of organic farming activities while the "549" score indicates the highest women's participation in organic farming activities.

The participation index score (PIS) is the score obtained by an activity against all respondents (Nasrin *et al.*, 2019; Nishi *et al.*, 2019; Nath and Athinuwat, 2021). To compare the extent of rural women's organic farming activities participation in terms of 6 general aspects as well as 20 organic farming activities, a participation index score (PIS) and a participation extent (PE) for each of the 6 general aspects were calculated by using the following formulas:

$$PIS=(N_{ne} \times 0)+(N_{ra} \times 1)+(N_{so} \times 2)+(N_{fr} \times 3) \quad [2]$$

where, PIS is a participation index score, N_{ne} is number of rural women participated never, N_{ra} is number of rural women participated rarely, N_{so} is number of rural women participated sometimes and N_{fr} is number of rural women participated frequently.

$$PE = OPS / PHPS \times 100 \quad [3]$$

where, PE is a participation extent, OPS is observed participation score and PHPS is possible highest participation score.

In the last section, multiple regression analysis

was used to determine the relationship between the level of the participation of rural women in organic farming activities and their socio-economic characteristics. In this model, the level of rural women's participation in organic farming activities was dependent variable, and their socio-economic characteristics were independent variables. Multiple regression analysis is an extension of simple linear regression. This method is used to measure the degree of influence of the independent variables on dependent variable and to predict the best relationship between dependent variable and independent variables (Kim and Kohout, 1975; Gujarati, 1995; Agha and Alnahhal, 2012). This model is formulated as in the following:

$$Y= \beta_0+\beta_1X_1+ \beta_2X_2+.....+\beta_nX_n+ \varepsilon \quad [4]$$

where, Y is dependent variable, β_0 is constant term, X_n is independent variables, $\beta_1,\beta_2,\ldots\beta_n$ are coefficients of the regression and ε is the error term. This equation can also be written as:

$$Y= f (X_1,X_2,.....,X_n) \quad [5]$$

In addition, the multicollinearity problem and the collinearity diagnostic were calculated for determine to correlation among the independent variables. Because, the strong correlation among the independent variables isn't usually preferred in this regression model. Thus, high tolerance (a tolerance close to 1) and low VIF (Variance Inflating Factor) (VIF<10) values indicate whether or not there is a multicollinearity problem among the independent variables (Hair *et al.*, 2006). These data were analyzed by using SPSS statistical analysis programme (SPSS, 2008).

3. Results and discussion

3.1. *Rural women's socio-economic characteristics*

The socio-economic characteristics of rural women who participation in organic farming activities was explained in Table 2. In the study area, it was determined that the majority of women (72.7%) participating in organic farming activities were between the ages of 31 and 50. The general average age was determined as 39.4. In a study conducted in Aydın province, which is located another region of Turkey, it was determined that the majority of women engaged in organic farming activities were 40 years old and above (Karaturhan *et al.*, 2018). Thus, the findings of this study are in line with the findings of Karaturhan *et al.* (2018). However, these results are different from the findings of Nishi *et al.* (2019), which concluded that 58.6% of the women participating in organic farming activities in Bangladesh were 35 years old or younger. These results in the study area revealed that the majority of women participating in organic farming activities were middle aged and above, and women in this age group participate in organic farming activities more than women aged 30 and under. The fact that middle-aged and older women in the study area are more conscious about the negative effects on the health of chemicals used in agriculture can be shown as the reason for this situation. Hence, it can be expected that women's willingness to tending from traditional agriculture to organic agriculture has increased.

In the study area, it was determined that 41.5% of the women were primary school graduates, 49.8% were secondary and high school graduates, and 8.7% were university graduates. In a study conducted in Aydın province, 34.1% of the women were found to be primary school graduates (Karaturhan *et al.*, 2018). In a study conducted in Thailand, it was stated that 46% of the women engaged in organic agriculture were university graduates (Nath and Athinuwat, 2021). These results in the study area revealed that the majority of women (58.5%) had a secondary school or higher education level. According to these results, it can be said that the ratio of women's primary school graduates in the present study is higher than that of women in Aydın. Also, it can be stated that the ratio of women's university graduates in the study area is much lower than that of women in Thailand. According to these results, it can be said that the increase in the education level of women has a significant effect on their participation in organic farming activities.

In the study area, the average household size of women participating in organic farming activities was found to be 3 persons. Also, the average household size is 3.4 persons in Turkey (TURKSTAT, 2019). These results revealed that the aver-

Table 2 - Socio-economic characteristics of the rural women (n=183).

Characteristics	*Frequency*	*Percentage*	*Mean*	***SD*
Age (year)				
≤30	24	13.1		
31-50	133	72.7	39.4	7.91
≥50	26	14.2		
Education level (year)				
Primary school graduate	76	41.5		
Secondary school graduate	51	27.9	8.0	3.17
High-school graduate	40	21.9		
University graduate	16	8.7		
Household size (person)				
≤2	87	47.5		
3-5	68	37.2	3.0	1.16
≥5	28	15.3		
Organic farming experience (year)				
≤4	28	15.3		
5-9	86	47.0	7.6	2.69
≥9	69	37.7		
**Household income (€ year^{-1})*				
≤€1803.6	54	29.5		
€1804-€3467.7	108	59.0	€ 2499.5	1026.3
≥€3468	21	11.5		
Agricultural land asset (hectare)				
≤25	131	71.6		
26-50	31	16.9	20.0	21.04
≥50	21	11.5		
Participation in agricultural training programs (Number of training)				
≤2	137	74.7		
3-4	30	16.4	1.3	0.63
≥4	16	8.7		

**1 Euro=7.21 TRY (Turkish lira) in March 2020; **SD=Standart deviation; Low income (≤€1803.6), Medium income (€1804-€3467.7), High income (≥€3468).*

age household size of women in the study area was below Turkey's average. In a study conducted in Bangladesh, it was determined that more than half of the women's (52.1%) average household size was 5 persons (Nishi *et al.*, 2019). In this context, it can be said that the size of households of women in the study area is less than the household size of women in Bangladesh, and the majority of them are part of a nuclear family structure.

In the study area, 47% of the women had between 5 and 9 years of experience in organic farming activities. Also, it was detected that women had knowledge about organic agriculture and they gained knowledge regarding this issue mostly from their own experience as well as their relatives. In a study conducted in Bangladesh, it was found that the vast majority of women (59.3%) had 10 years or less experience in organic farming activities (Nishi *et al.*, 2019). In a study conducted in Thailand, it was stated that the majority of women had between 11 and 20 years of experience in organic farming activities (Nath and Athinuwat, 2021). The findings of this study are consistent with those of Nishi *et al.* (2019). Also, women in the study area have fewer experience in organic agriculture activities than that of women in Thailand. Therefore, the increase in experiences regarding women's

organic farming activities may positively affect their possibility to participate in this activity.

In the study area, 59% of the women participating in organic farming activities had an annual household income level between €1804-€3467.7 and 11.5% of them had an income of €3468 and above. In a study conducted in India, it was found that the household income level of women in farms where organic agriculture was carried out in the high-income group (Poyyamoli and Padmavaty, 2011). These results revealed that the majority of women was in the middle-income group, and their household income level was lower than that of women in India. Hence, the increase in the household income level of women can affect on their participation in organic farming activities.

In the study area, it was determined that the majority of women (71.6%) participated in organic farming activities on lands of 25 hectares and less, and the average land size was 20 hectares. In a study conducted in Mardin province, which is located Southeastern Anatolia region of Turkey, it was stated that 50% of the farmers carried out their organic farming activities on lands less than 20 hectares (Acıbuca *et al*., 2018). These results revealed that that the majority of organic farming activities in the study area were carried out on lands of 25 hectares and less. According to these results, it can be said that the size of land in the study area is larger than the land size in Mardin province. In this context, it can be said that the increase in the land size has an effect on the participation of women in organic farming activities. In order word, it is expected that women's participation in organic farming activities will increase and more women will contribute to the labour force due to the increase in land size.

In the study area, 74.7% of the women participating in organic farming activities attented 2 or less than 2 agricultural training programs. In a study conducted in Bangladesh, it was found that 41.5% of the women who participated in organic agriculture activities attend agricultural training at all (Nishi *et al.*, 2019). In the study conducted in Thailand, it was found that 96% of the women received training for up to 30 days (Nath and Athinuwat, 2021). These results revealed that women's participation tendencies for agricultural training programs were low in study area. Also, women's participation tendencies for agricultural training programs are higher than that of women in Bangladesh. Therefore, the increase in women's participation in agricultural training programs is expected to have an impact on their tendencies towards organic farming activities. Because, the subjects regarding organic agriculture activities included in agricultural education programs, also. Furthermore, the women in the study area stated that these training programs contribute to organic farming activities.

3.2. *The participation level of rural women in organic farming activities*

In the current study, 20 organic agriculture activities were defined to determine the participation level of rural women in organic farming activities. These activities were scored according to the level of women's participation. According to these scores, those who had 20 scores or less from 20 organic farming activities were grouped into the low participation category, those who had between 21 and 40 scores were grouped into the medium participation category, and those who had 40 scores and above were grouped into the high participation category. These data were explained

Table 3 - The participation level of rural women in organic farming activities (n=183).

Level of participation	*Score*	*Frequency*	*Percentage*	*Mean*	**SD*	*Min.*	*Max.*
Low	≤20	15	8.2	37.4	7.8	17	50
Medium	21-40	90	49.2				
High	≥40	78	42.6				
Total		183	100.0				

**SD=Standard deviation.*

Table 4 - The rank order of the rural women in case of participation in organic farming activities based on participation index score (PIS) and participation extent (PE) (n=183).

Activities	*Frequently (3)*	*Sometimes (2)*	*Rarely (1)*	*Not at all (0)*	*PIS*	*PE (%)*	*Rank (20-issues)*	*Rank (6-aspects)*
A. Land								
1. Land selection	118	36	10	19	436	79.4	5th	
2. Soil preparation	113	41	11	18	432	78.7	7th	
$\bar{X}$ of A					434			2nd
B. Seed								
3. Seed growing	131	19	14	19	445	81.1	4th	
4. Seed sowing	123	28	9	23	434	79.1	6th	
5. Seed preservation	73	21	10	79	271	49.4	17th	
$\bar{X}$ of B					383.3			4th
C. Fertilizer Application								
6. Organic material collection (animal manure, agricultural residue, etc.)	158	12	2	11	500	91.1	1st	
7. Compost making	146	9	8	20	464	84.5	3rd	
8. Preservation of the compost	125	17	12	29	421	76.7	8th	
9. Applying the compost	123	20	11	29	420	76.5	9th	
$\bar{X}$ of C					451.3			1st
D. Cultural Operations								
10. Soil cultivation	99	44	13	27	398	72.5	12th	
11. Irrigation	149	13	7	14	480	87.4	2nd	
12. Thinning	68	31	12	72	278	50.6	16th	
13. Weed control	112	27	13	31	403	73.4	11th	
14. Past control	22	117	22	22	322	58.6	15th	
15. Crop rotation	66	90	5	22	388	70.7	13th	
$\bar{X}$ of D					378.2			5th
E. Harvest Operations								
16. Picking of product	118	22	13	30	411	74.9	10th	
17. Grading	100	29	17	37	375	68.3	14th	
$\bar{X}$ of E					393			3rd
F. Marketing								
18. Packaging	15	11	4	153	71	12.9	19th	
19. Transporting	8	13	7	155	57	10.4	20th	
20. Selling	17	50	13	103	164	29.9	18th	
$\bar{X}$ of F					97.3			6th

in Table 3. These results showed that women's participation level in organic farming activities ranged from 17 to 50 scores against the possible ranged of 0-60 scores. The mean was 37.4 with a standard deviation of 7.8. Furthermore, 49.2% of the women had a medium level of participation in organic farming activities while 42.6% and 8.2% of them had high and low level of participation in organic farming activities, respectively. In a study conducted in Bangladesh, it was found that women had medium and high participation in organic farming activities (Nishi *et al.*, 2019). The results of the present study are similar with those of Nishi *et al*. (2019). These results revealed that women participate in organic farming activities have medium and high level. This situation can be interpreted as an indication of the importance given by rural women to participate in organic farming activities. Considering that the majority of women (57.4%) participate in organic agriculture activities at a medium and low level, it may be important to increase tendencies of women towards agricultural training programs conducted by the public extension, and agricultural credit supports. Because, these programs and supports are expected to be effective in increasing the participation ratios of women in organic agriculture activities. To measure the extent of rural women's participation in 20 organic farming activities under 6 general aspects, a participation index score (PIS) and a participation extent (PE) were calculated (Table 4). These results showed that the participation extent of women in organic farming activities was ranged from 10.4% to 91.1%. In addition, it was revealed that organic material collection (91.1%), irrigation (87.4%) and compost making (84.5%) ranked 1st, 2nd and 3rd, respectively, among 20 organic farming activities. Also, it was determined that organic farming activity with the least participation ratio of the women was transporting (10.4%). In a study conducted in Bangladesh, it was stated that collecting of the organic product from own residence, collecting of material for fertilizer application and decomposing of compost ranked 1st, 2nd and 3rd, respectively, among all organic farming activities (Nishi *et al.*, 2019). In a study conducted in India, it was found that women participated in organic farming activities by the production of compost and vermicompost (Daniel, 1999). Organic material collection, which is one of the organic farming activities, ranked 1st among the participation extent of women in organic farming activities in the study area. The results are similar with those of Nishi *et al.* (2019), which explained that the collection of the organic product from its own residence ranked 1st among all organic farming activities. However, the findings of this study are not congruent with the results of the study conducted in India, which reported that women participated in organic farming activities by the production of compost and vermicompost (Daniel, 1999).

In this study, it was determined that the participation index score of the women in organic farming activities was ranged from 97.3 to 451.3 as mean value ($\bar{X}$) (Table 4). According to the results of the participation index score, women's participation in organic farming activities was highest in the fertilizer application stage ($\bar{X}$ =451.3) and the least in the marketing stage ($\bar{X}$ =97.3). The other activities participated by women were land ($\bar{X}$ =434), harvest operations ($\bar{X}$ =393), seed ($\bar{X}$ =383.3) and cultural operations ($\bar{X}$ =378.2), respectively. In a study conducted in Bangladesh, it was found that while the participation of women in organic farming was highest in the land management stage, the lowest participation was in the product marketing stage (Nishi *et al.*, 2019). The findings of the present study are not congruent with the results of the study conducted in Bangladesh, which reported that the participation of women in organic farming was highest in land management. In the study area, these results revealed that women's participation in organic farming activities is the least in the marketing stage. According to all results in Table 4, it can be said that the women have successful in being a part of the organic farming system and in contributing to the development of this system. The tendencies of women's participation in organic agriculture activities are high in the study area since organic agriculture is a sustainable source of income and organic products constitute a healthy food source. Also, it can be said that women are conscious about participation in organic farming activities.

Table 5 - Multiple regression estimates of factors affecting the level of the participation of rural women in organic farming activities.

Variables	*Unstandardized coefficients*		*Standardized coefficients*	*t*	*p**	*Correlations*		*Collinearity statistics*	
	B	*[a]SE*	*Beta*			*Partial*	*Part*	*Tolerance*	*VIF*
Constant	32.347	2.167		14.929	0.000				
X_1	-0.310	0.045	-0.314	-6.892	0.000	-0.462	-0.254	0.655	1.527
X_2	0.682	0.095	0.277	7.212	0.000	0.479	0.266	0.924	1.083
X_3	-4.319	0.266	-0.642	-16.235	0.000	-0.775	-0.599	0.871	1.148
X_4	1.660	0.131	0.572	12.631	0.000	0.691	0.466	0.665	1.505
X_5	0.003	0.000	0.368	9.209	0.000	0.571	0.340	0.851	1.174
X_6	0.077	0.014	0.207	5.546	0.000	0.387	0.205	0.975	1.025
X_7	2.785	0.461	0.226	6.045	0.000	0.416	0.223	0.974	1.027

*Dependent variable: Y (the level of the participation of rural women in organic farming activities); Independent variables: X_1(age), X_2(educational level), X_3(household size), X_4(organic farming experience), X_5(household income); X_6(agricultural land asset); X_7(participation in agricultural training programs); R=0.873; R^2=0.762; Adjusted R^2=0.752; The levels of significance=*p<0.05; F(7;175)=79.88, p=0.000*(p<0.001); [a]SE=Standard error.*

3.3. *Factors affecting women's participation in organic farming activities*

In this study, multiple regression analysis was used to determine the factors (socio-economic characteristics) that affect the participation level of women in organic farming activities (Table 5). Partial correlation scores between the variables were found below 0.80. Furthermore, it was found that the variance inflation factor (VIF) values for all variables were smaller than 10. Thus, it was found that there was no multicollinearity problem between the independent variables in this model. The results of ANOVA statistics showed that seven independent variables in the model significantly predicted the dependent variable. In this analysis, it was found that the degree of model that predicts the dependent variable was R=0.873, and the degree of model that explains the variance in the dependent variable was R^2=0.752. The R^2 value of 0.752 showed that 75.2% of the variance in the participation level of rural women in organic farming activities was explained by seven independent variables. Based on the multiple regression analysis results, the regression equation was obtained as follows:

$$Y=32.347-0.310X_1+0.682X_2-4.319X_3+1.660X_4+0.003X_5+0.077X_6+2.785X_7$$

Age is an effective factor in women's participation in socio-economic activities (Yount *et al.*, 2014; Nath and Athinuwat, 2021). Because, the change in women's age may affect their participation in socio-economic activities. Therefore, their participation in organic farming activities may also change depending on the change in the age of women. In this study, it was determined that there was a negative and statistically significant relationship (P<0.05) between the participation level of women in organic farming activities and their ages. Thus, when the age of women increases by one year, their participation in organic farming activities decreases by 0.310. In studies conducted in India and Sri Lanka, a negative relationship was found between age and women's participation in agricultural production (Sireeranhan, 2013; Shamna *et al.*, 2018). The results of the present study are similar with those of Sireeranhan (2013) and Shamna *et al.* (2018). However, these results are not congruent with those of Yusuf *et al.* (2015), which indicated that there was a positive relationship between age and women's participation in agricultural production. As far as is known, farm structure affects the organisation of labour. Therefore, this situation tends to be more complex in organic farms that are usually based on

more activities (Jansen, 2000; Morison *et al.*, 2005; Lobley *et al.*, 2009; Dinis *et al.*, 2015). The studies on organic agriculture stated that organic agriculture is generally as a production system that requires more labour-intensive than traditional agriculture (Jansen, 2000; Sharma and Singh, 1997; Nana *et al.*, 2015; Yılmaz and Yücel, 2017; Merdan, 2018). Furthermore, this system usually requires more labour intensive because it needs more time for managing weeds and monitoring pests. For this reason, considering that the majority of women who participate in organic farming activities in the study area are between the ages of 31 and 50, it can be expected that their tendencies towards organic farming activity, which requires labour-intensive, may decrease or they may face health problems depending on the increase in the age of women. As a result of possible health problems that may arise due to the increase in the age of women, their participation in organic farming activities will also decrease. It can be stated as an expected result that middle age women are more likely to participate in agricultural production activities than older women. Therefore, it is important to increase the participation in organic farming activities of women aged 30 and under in the study area. Because it can be expected that young women are more likely to participate trainings and to adopt innovations regarding organic farming than women in other age groups. This situation can make important contributions to the development of organic farming activities. These results revealed that age has an effect on the participation in organic farming activities of women in the study area.

Education plays an important role in raising awareness in the efficient and productive use of resources. Also, it can be effective in facilitating women's participation in the labour force by strengthening their position in society and households (Cameron *et al.*, 2001). Furthermore, increasing the level of education is also important in terms of adapting and participating in innovations regarding agricultural activities (Paulos *et al.*, 2004). Therefore, depending on the change in the education level of rural women, their participation in organic farming activities may also change. In this study, it was found that there was a positive and statistically significant relationship ($P<0.05$) between women's participation level in organic farming activities and their educational level. Thus, when the education level of women increases by one year, their participation in organic farming activities increases by 0.682. In a study conducted in Bayburt, Erzurum, and Erzincan provinces, which is located another region of Turkey, it was reported that the illiteracy of 41.8% of women living in rural areas had a negative effect on the expansion of the effects of organic agriculture (Kaya and Atsan, 2012). The results of the present study were supported by findings of Hosseini and Ajoundani (2013) and Karaturhan *et al.* (2018), which indicated that there was a positive relationship between the increase in education level and women's participation in organic agriculture activities. Considering that more than half of the women (58.5%) participating in organic farming activities in the study area has a secondary school or higher education, it can be expected that the increase in the education level of women may be effective in gaining experience and increasing their knowledge level. Therefore, increasing the education level of rural women can help them to be more confident and active in their participation in various agricultural activities including organic farming. Consequently, women's tendencies towards new production techniques, agricultural equipment, and production activities may increase. These results revealed that the educational level had an effect on the participation of women in organic farming activities.

Household size is an effective factor in the decision-making process regarding women's labour force participation. Because, the increase or decrease in the number of members in the household may affect women's participation in the labour force. Therefore, depending on the change in the number of members of the household in rural areas, women's participation in organic farming activities may also change. In this study, it was determined that there was a negative and statistically significant relationship ($P<0.05$) between women's participation level in organic farming activities and their household size. Thus, when the number of women's household members increases by one person,

their participation in organic farming activities decreases by 4.319. In Turkey, it is known that the number of household members and women's marital status has an impact on the labour force participation ratios of women (Er, 2013). Accordingly, it can be said that the number of household members has a significant effect on the participation of women in agricultural activities. Considering that the household size of the women in the study area is 3 people on average and the majority of them are in nuclear family structure, depending on the increase in the number of members in the household, it can be stated that the responsibilities of women in home will increase a little more and they will have a higher workload. This situation is expected to negatively affect the participation of women in organic farming activities. These results revealed that the number of household members had an effect on the participation of rural women in organic farming activities.

Agricultural experience can be explained as all of the knowledge and experiences gained by farmers during the period that are interested in agricultural activities. Therefore, the time spent in agriculture is expected to affect the tendencies of farmers to agricultural activities. Accordingly, the agricultural experience can always provide different opportunities to women farmers in order to get the necessary information and solution recommendations about different agricultural problems (Nath and Athinuwat, 2021). Therefore, depending on the change in the organic farming experience of rural women, their participation in organic farming activities may also change. In this study, it was found that there was a positive and statistically significant relationship ($P<0.05$) between women's participation level in organic farming activities and their organic farming experience. Thus, when the organic farming experience of women increases by one year, their participation in organic farming activities increases by 1.660. In a study conducted in the province of Burdur, which is located another region of Turkey, it was found that agricultural experience had a positive effect on women's decision to participate in agricultural activities (Kutlar *et al*., 2013). The results of the present study are similar with those of Kutlar *et al.* (2013), which indicated that there was a positive relationship between women's agricultural experience and their participation in agricultural activities. Thus, it can be said that women gaining agricultural experience in time will make positive decisions about their lives and participation in agricultural activities. Considering that 47% of the women in the study area have organic farming experiences between 5 and 9 years, women's tendencies towards this activity is expected to increase as a result of the increase in knowledge and experience of rural women who have gained organic agriculture experience. Because, it is thought that women who have organic farming experience will plan their production activities more rationally and use their knowledge more effectively. In other words, a certain time period is required for change over from conventional agriculture to organic agriculture depend on produced organic product varieties. Due to the difficulties in the production conditions of organic agriculture, this production process may fail in the first years. Therefore, producers who can continue this production activity can be expected to longer years of activities, on an average. These results revealed that organic farming experience had an impact on the participation of women in organic farming activities.

Household income is an important factor in women's participation in agricultural activities. Depending on whether the household income level of women is high or low, their tendencies towards agricultural activities may also change. Thus, the women with high household income level may also a high tendency towards alternative farming methods have except for traditional agriculture (such as organic agriculture). Therefore, depending on the change in household income of women, their participation in organic farming activities may also change. In this study, it was found that there was a positive and statistically significant relationship ($P<0.05$) between the participation level of women in organic farming activities and their household income. Thus, when the household income of women increases by one unit, their participation in organic farming activities increases by 0.003. In a study conducted in Pakistan, it was found that an annual farm income had a positive

effect on women's participation in agricultural activities. Also, women's participation tendencies in agricultural activities also increased as farm income increased (Zahoor *et al.*, 2013). The results of the present study are similar with those of Zahoor *et al.* (2013), which indicated that there was a positive relationship between an annual farm income and women's participation in agricultural activities. Considering that more than half (59%) of the women participating in organic farming activities in the study area have middle-income groups, the increase in household income will increase their participation tendencies in organic farming activities. In this context, it is considered that households who have high-income will have financial resources in oder to provide employment for more female labour force since organic farming activity are labour intensive model of a production and requires more female labour force. This situation is expected to positively affect the participation tendencies of women in organic farming activities. Furthermore, women's tendencies to innovations regarding organic farming activities may increase depending on increase in household income and they can buy land or utilize from their existing lands in order to increase their organic farming activities. Also, their willingness to maximum participation engagement in product-related activities may increase in order to further increase the current income level. These results revealed that the household income had an effect on the participation of women in organic farming activities.

Agricultural land assets can be seen as an important advantage for producers engaged in agricultural production activities including organic agriculture. Because the increase in agricultural land assets of women participating in agricultural production activities may affect their tendencies towards production activities. Therefore, the participation of women in organic farming activities may also change depending on the change in agricultural land assets. In this study, it was found that there was a positive and statistically significant relationship ($P<0.05$) between the participation level of women in organic farming activities and their agricultural land assets. Thus, when the agricultural land assets of women increase by one hectare, their participation in organic farming activities increases by 0.077. In a study conducted in Pakistan, it was determined that having agricultural land assets had a positive effect on women's participation in agricultural activities. The results of the present study are similar with those of Ejaz (2007), which indicated that there was a positive relationship between agricultural land assets and their participate in agricultural activities. Considering that the majority of women (71.6%) participating in organic farming activities in the study area have land of 25 hectares or less, the increase in land assets is expected to increase their tendencies to participate in organic farming activities. Because, the increase in the agricultural land assets of women participating in organic farming activities will positively affect their production amount and their desire for more revenue generation. By this means, the tendencies of women to participate in organic farming activities will also increase. These results revealed that the agricultural land assets had an effect on the participation of women in organic farming activities.

One of the most important functions of organic agriculture has positive effects on human health. In other words, it is one of the most important parts of a healthy and balanced nutrition. For this reason, it is important to raise awareness about organic agriculture especially for women in rural areas. Because, raising the awareness of women about organic farming activities may positively affect their participation in organic farming activities and the awareness of members in the household indirectly about organic farming. Therefore, rural women participating in agricultural training programs may have higher tendencies towards different agricultural methods (such as organic agriculture). Consequently, depending on the change in the number of their participation in agricultural training programs of women, their participation in organic agriculture activities may also change. In this study, it was found that there was a positive and statistically significant relationship ($P<0.05$) between the participation level of women in organic farming activities and their participation in agricultural training programs. Thus, when the number of women participating in agricultural training pro-

grams increases by one unit, their participation in organic farming activities increases by 2.785. The results of the present study are similar with those of Singh *et al.* (2015), which indicated that there was a positive relationship between participation in informative agricultural activities and women's participation in agricultural production. Considering that 74.7% of women participating in organic agriculture in the study area joined in 2 or less than 2 agricultural training programs, it is expected that the increase in the number of women's participation in agricultural training programs will positively affect their participation in organic agriculture activities. The fact that women tend to participate more than 2 in agricultural training programs can be interpreted as an indication that they are more open to innovations and desire to gain more experience in agricultural production. For this reason, it is thought that agricultural education programs are important in terms of expanding the perspective of women and providing them with the ability to carry out agricultural activities more effectively. These results have revealed that the number of participations in organic agriculture programs affected the participation of women in organic agriculture activities.

3.4. *Limitations and recommendations*

The present study had some limititations. First limitation was the selection of sample. Because, it was focused on women who participated in organic farming activities in Çanakkale province, which is located northwestern part of Turkey. It just represented Çanakkale province. However, due to the limited literature about this issue in Turkey, the findings obtained from this study may contribute to compare the results of study that will be conducted in different regions with regard to this topic. Second limitation was the method used in data collection. The face-to-face survey method was used in this study. It is considered that this method is more reliable than online or internet survey as researchers conducting face-to-face survey can evaluate whether persons who answered survey questions are being trustworthy or not and explaine questions that is misunderstood in questionnaires. It is not as easy and cheap as online or internet survey. Due to time and budget constraints, the scope of this study was not able to expanded more generally in Turkey. Thus, in future studies, the determining the participation levels of women participating in organic farming activities in different regions is expected to be useful in comparing their role in organic farming.

4. Conclusions

In the study area, the tendencies of women to participate in organic farming activities is high because organic agriculture is a sustainable source of income. However, the majority of women participating in organic farming activities are middle-aged and above. For this reason, encouraging women aged 30 and under to increase their participation in organic farming activities is important in terms of the development of organic agriculture. Since the majority of women (57.4%) participated in organic farming activities in medium and low level, increasing women's tendencies towards both agricultural training programs conducted by the public extension organizations and agricultural credit supports may be effect to enhance their ratio of participation in organic farming. In the study area, women's participation in organic farming activities was different extent. Women mostly participated in activities such as organic material collection, irrigation, compost making and seed growing. Age, educational level, household size, organic farming experience, household income, agricultural land asset and participation in agricultural training programs showed a statistically significant relationship with women's participation in organic farming activities. In this context, these socio-economic characteristics have effect on women's participation tendencies in organic agriculture activities. As a result, from the essence of the findings explained above, it can be concluded that participation level of rural women in organic farming activities is not satisfactory and so adequate support should be provided to take the necessary steps related to expanding this activity to increase their participation in organic farming activities. Furthermore, the results

of this study can helpful for development strategies of action that will motivate to adopt organic farming of rural women by agricultural extension workers and researchers.

References

Acıbuca V., Eren A., Budak D.B., 2018. The faced problems of organic farming producers (sample of Mardin province). *Journal of Bahri Dagdas Crop Research*, 7(2): 39-46.

Adinolfi F., Capitanio F., De Rosa M., Vecchio Y. 2020. Gender differences in farm entrepreneurship: comparing farming performance of women and men in Italy. *New Medit*, 19(1): 69-82.

Agha S.R., Alnahhal M.J., 2012. Neural network and multiple linear regression to predict school children dimensions for ergonomic school furniture design. *Applied Ergonomics*, 43(6): 979-984.

Altenbuchner C., Vogel S., Larcher M., 2017. Effects of organic farming on the empowerment of women: a case study on the perception of female farmers in Odisha India. *Women's Studies International Forum*, 64: 28-33.

Anonymous, 2019. Records of Çanakkale Directorate of Provincial Agriculture and Forestry. Çanakkale, Turkey.

Cameron L.A., Malcolm Dowling J., Worswick C., 2001. Education and labor market participation of women in Asia: evidence from five countries. *Economic Development and Cultural Change*, 49(3): 459-477.

Chiappe M.B., Flora C.B., 1998. Gendered elements of alternative agriculture paradigm. *Rural Sociology*, 63(3): 372-393.

Cochran W.G., 1977. *Sampling Techniques*. New York: John Wiley and Sons.

Daniel L., 1999. *Women in biodiversity conservation. Leisa India, 1(3): 19-20.*

Deepak K.S., Senthil D., 2018. Challenges in organic farming and marketing the organic products in Tamil Nadu. *International Journal of Management Studies*, 2(1): 136-140.

Dinis I., Ortolani L., Bocci R., Brites C., 2015. Organic agriculture values and practices in Portugal and Italy. *Agricultural Systems*, 136: 39-45.

Ejaz M., 2007. Determinants of female labor force participation in Pakistan: an empirical analysis of PSLM (2004-05) micro data. *The Lahore Journal of Economics*, 12 (Special Issue): 203-235.

Er Ş., 2013. Spatial analysis of factors affecting female labour force participation rates in Turkey. *Journal of Marmara University Institute of Social Sciences*, 10(40): 35-44.

Gujarati D.N., 1995. *Basic econometrics*. New York: McGraw-Hill International Editions Publishers.

Hair J.F., Black W.C., Babin B.J., Anderson R.E., Tathan R.L., 2006. *Multivariate Data Analysis*. New Jersey: Pearson Prentice Hall.

Hosseini S.J., Ajoundani Z., 2013. Affective factors in adopting organic farming in Iran. *Annals of Biological Research*, 3(1): 601-608.

Jansen K., 2000. Labour, livelihoods and the quality of life in organic agriculture in Europe. *Biological Agriculture and Horticulture*, 17(3): 247-278.

Karaturhan B., Uzmay A., Koç G., 2018. Factors affecting the probability of rural women's adopting organic farming on family farms in Turkey. *Journal of Agriculture Faculty of Ege University*, 52(2): 153-160.

Kaya T.E., Atsan T., 2012. Rural women's socio-economic status and future expectations (the case of TRA1 region). *Turkish Journal of Agricultural Economics*, 18(1): 1-11.

Kim J.O., Kohout F.J., 1975. Multiple regression analysis: subprogram regression. In: Nie N.H., Hall C.H., Jenkins J.G., Steinbrenner K., Bent D. (eds.), *Statistical Package for the Social Sciences*. NewYork: McGraw-Hill.

Korkmaz A., Tüfekçi N.U., 2007. Woman and their problems in work life and agriculture: case of Ağlasun district. *Süleyman Demirel Üniversity The Journal of Faculty of Economics and Administrative Sciences*, 12(1): 37-61.

Kutlar İ, Kızılay H., Turhanoğulları Z., 2013. Determining the socio-economic factors affecting on labor force and decision participations of women in rural areas: a case study in the province of Burdur. *Mediterranean Agricultural Sciences*, 26(1): 27-32.

Lobley M., Butler A., Reed M., 2009. The contribution of organic farming to rural development: an exploration of the socio-economic linkages of organic and non-organic farms in England. *Land Use Policy*, 26(3): 723-735.

Merdan K., 2018. Current state of organic agriculture in Turkey and evaluation of its potential development bu means of swot analysis. *Social Sciences Studies Journal*, 4(14): 523-536.

Morison J., Hine R., Pretty J., 2005. Survey and analysis of labour on organic farms in the UK and Republic of Ireland. *International Journal of Agricultural Sustainability*, 3(1): 24-43.

Nana P.D., Andrieu N., Zerbo I., Ouedraogo Y., Le Gal P.Y., 2015. Conservation agriculture and performance of farms in West Africa. *Cahiers Agricultures*, 24(2): 113-122.

Nasrin S., Islam M.M., Mannan M.A., Ahmed M.B., 2019. Women participation in rooftop gardening in some areas of Khulna City, Bangladesh. *Journal of Agricultural Research,* 44(2): 327-337.

Nath T.D., Athinuwat D., 2021. Key factors of women empowerment in organic farming. *GeoJournal*, 86: 2501-2520. https://doi.org/10.1007/s10708-020-10211-6.

Nishi N.Y., Islam Md. M., Ahmed M.B., 2019. Participation of rural women in organic farming. *Asian Journal of Agricultural Extension, Economics & Sociology*, 33(3): 1-14.

Paulos A., Belay K., Hamito D., 2004. Determinants of farmers' willingness to pay for soil conservation practices in the Southeastern Highlands of Ethiopia. *Land Degradation & Development,* 15(4): 423-438.

Poyyamoli G., Patmavaty A., 2011. Analyzing innovative practices extend and income generation in organic farming and GRA fields in Bahour, Puducherry, India. *Journal* of *Development and Agricultural Economics,* 3(6): 252-260.

Roy S., Mondal S., 2015. Women's involvement in organic (vegetables) farming system activities (OFSA) in Samsung district of North-East Thailand. *IOSR Journal of Humanities and Social Science*, 20(7): 8-13.

Sakiluzzaman Md., Sarker M.A., Rahman M.Z., Hasan Md. M., Lei B., Mukta Z.N., 2018. Determinants of rural youth's participation in commercial agriculture: a case study from southern Bangladesh. *International Journal of Economics, Commerce and Management*, VI(4): 507-524.

Santhi S., Kalirajan V., 2019. Study the profile characteristics of farm women with reference to decision making behaviour. *Asian Journal of Agricultural Extension, Economics & Sociology*, 29(1): 1-5.

Shamna A., Biswas P., Jha S.K., Sarkar S., Kumar S., 2018. Tribal farm women's participation in agriculture and factors influencing it: evidence from West Bengal, India. *Journal of Agricultural Science and Technology*, 20(5): 911-922.

Sharma S., Singh, S.P., 1997. Human resources and sustainable agriculture: a case study from central Himalaya. *Journal of Sustainable Agriculture*, 10(1): 75-86.

Singh S., Kushwah S., Sngh V.B., Daipuria O.P., 2015. Factor affecting the participation of rural women in agricultural activities. *Indian Research Journal of Extension Education*, 15(1): 81-83.

Sireeranhan A., 2013. Participation of family-women in agricultural production: a case study of Jaffna district, Sri Lanka. *Journal of Economics and Sustainable Development*, 4(13): 143-147.

Sisto I., Furst M., 2019. *Why shall we consider the gender implications of biodiversity management? The role of women in the Mediterranean region. New Medit*, 18(3): 109-111.

SPSS, 2008. *SPSS Statistics Base 17.0 for Windows User's Guide*. Chicago: SPSS Inc.

Svotwa E., Baipai R., Jiyane J., 2009. Organic farming in the small holder farming sector of Zimbabwe. *Journal of organic systems*, 4(1): 8-14.

Turhan Ş., Vural H., Ak İ., Erdal B., 2017. Consumer trends for organic products: the case of the Marmara Region in Turkey. *Fresenius Environmental Bulletin*, 26(12A): 8160-8165.

TURKSTAT, 2019. Statistical Indicators. Turkish Statistical Institute. Statistics Annual Report, Ankara.

Trauger A., 2004. 'Because they can do the work': women farmers in sustainable agriculture in Pennsylvania, USA. *Gender, Place & Culture: A Journal of Feminist Geography*, 11(2): 289-307.

Urena F., Bernabeu R., Olmeda M., 2008. Women, men and organic food: differences in their attitudes, and willingness to pay a Spanish case study. *International Journal of Consumer Studies*, 32(1): 18-26.

Yılmaz Ö., Yücel G.E., 2017. The transformation of Turkey in agriculture during the sustainable development process, *Suleyman Demirel University Journal of Faculty of Economics and Administrative Science*, 22(1): 179-199.

Yount K.M., Dijkerman S., Zureick-Brown S., VanderEnde K.E., 2014. Women's empowerment and generalized anxiety in Minya Egypt. *Social Science & Medicine*, 106: 185-193.

Yusuf H.A., Nuhu K.J., Shuaibu H., Yusuf H.O., Yusuf O., 2015. Factors affecting the involvement of women in income generating activities in Sabon-Gari Local Government Area of Kaduna State, Nigeria. *American Journal of Experimental Agriculture*, 5(1): 54-59.

Zahoor A., Fakher A., Ali S., Sarwar F., 2013. Participation of rural women in crop and livestock activities: a case study of Tehsil Tounsa of Southern Punjab (Pakistan). *International Journal of Advanced Research in Management and Social Sciences*, 2(12): 98-121.