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The features of farmers preferring environmentally friendly agricultural methods: The case of Turkey

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The agricultural sector has a strategic importance; therefore, the primary goal of every country is to ensure self-sufficiency in terms of agricultural produces. For this reason, the agricultural sector in every country has been supported. Agricultural support policies for product prices and inputs have caused increased productivity and intensification in the sector. Nevertheless, this intensification and growth in agriculture have also brought about various environmental problems. The adverse effects of agricultural activities on the environment can be specified as loss of biodiversity and deterioration in the quality of soil, water and air. With the increasing public awareness, governments have integrated environmental concerns into the agricultural policy to solve these environmental problems. Recently, the impact of agriculture on the environment has become a significant issue for agricultural policy in Turkey. Turkey has introduced many policy measures in agriculture to encourage and promote environment. One of these implementations is to support producers who prefer agricultural practices foreseen in the environmentally based agricultural land protection. In this study, the common characteristics of the producers participating in the Environmentally Based Agricultural Land Protection Program (ÇATAK) in Kırşehir province, one of the provinces where this program has been started as a pilot area study in Turkey, have been determined using the Multi Correspondence Analysis Method. The producers participating in ÇATAK program are those with higher education levels and larger enterprises compared to other producers and are more innovator. At the same time, it has been determined that these producers are more sensitive to the environment.

Key words: Agro-environment policy, policy implementations, ÇATAK, support programs, Turkey.

INTRODUCTION

As the world population increases rapidly and the agricultural fields are limited, productivity per unit needs to be high. Ensuring increase in productivity, using productive varieties, increase of consumption of chemical inputs used in agriculture, have been carried out through soil cultivation and eventually, intensitivity. This modernization period caused an increase in environmental problems along with the successes it brought. Problems like pollution of water and land resources, decrease of biological variety, spread and resistance of illnesses and pests, and the need to use more chemicals made the agricultural sector to pollutes the environment.

After the 1980s, it has become widely acknowledged that agriculture has negative effects on the environment as well as positive ones (Lankoski et al., 2005). Many studies show that senseless and intensive input use in agriculture has negative effects on environment and human health. These effects include chemical contamination of soil, decrease in soil productivity, soil erosion, chemical contamination of underground waters and endangering life in that environment, air pollution, loss of bio-diversity, and threatening the health of humans that consume those foods (Kim, 2001).

In order to decrease the negative effects of agriculture on the environment and, if possible, to prevent them, many countries are taking agro-environment measures. For the success of the agro-environment policies, which actually integrate the policies related separately to

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Abbreviation: ÇATAK, Environmentally based agricultural land protection program.

agriculture and environment, the relation between agriculture and environment should be understood well, because agriculture evidently depends on the quality of soil and water, both of which are the elements of the environment. In providing the continuity of agricultural production, the existence of an unpolluted environment is vital (Sumelius et al., 2005). Agricultural sector, with the priority of increasing agricultural production in the 20th century, had to change its priority because of the environmental problems it caused, and the developed countries in particular have made reforms in their agricultural policies in the last quarter of the 20th century to decrease the negative effects of agriculture on the environment (Banks and Marsden, 2000).

Although, the development of mechanisms for preserving agricultural areas dates back to days before 1949, the applications in this field were actually developed in the 1980s (Hodge, 2001). The aim of the environmental measures is to promote methods for the conservation of the environment and to preserve the countryside (Oltmer et al., 2000).

Agro-environmental policies range from obligatory approaches, such as policy instruments, legislative regulations and environment taxes, to voluntary approaches, such as technical assistance and support programs (Claassen et al., 2001). The participation of the farmers in agro-environment measures is usually performed on a voluntary basis. The participants receive a payment in return for carrying out an agro-environmental commitment but there are rules that they have to obey in return for this payment (Claassen et al., 2001).

Agro-environment measures are usually implemented for the promotion of a more environmentally friendly agriculture in the world. Environmentally friendly agricultural production systems usually include these implementations: Restricting or abandoning the use of chemical fertilizers and pesticides, decreasing the degree of pasture use, application of crop rotation to avoid the pollution of underground water, growing feed crops (Piorr, 2003).

Application of policies that will decrease and/or prevent the negative effects of agriculture in Turkey, which has rich soil-water sources and biological diversity thanks to its geography, is a new practice, because agricultural environment precautions have not become a priority as the use of chemicals is low in agriculture in Turkey. Although, limited eco-friendly practices started to be practiced in Turkey at the beginning of 2000s'.

One of the agro-environmental measures applied in Turkey is Environmentally Based Agricultural Land Protection Program (ÇATAK). Within the scope of ÇATAK program, a support grant is paid to the producers in theprogram for three years in order to maintain the quality of soil and water in the agricultural fields, sustainability of renewable natural sources and decreasing the negative effects of intensive agriculture on the environment.

Having been started as a pilot project in 2006, ÇATAK was started in four cities (Kırşehir, Konya, Isparta and Kayseri). Villages defined as sensitive regions were designated in four cities within the scope of the pilot application, and the common characteristic of the designated regions is that they are wetlands. The aim of the program is to prevent the land loss caused by water and wind erosion, desertification, saltiness, contamination by wastes and inputs used in agricultural production, and to decrease the problems.

Within the scope of ÇATAK, payments are made in three categories:

Category 1

(i) Fighting against erosion.
(ii) Rehabilitation of the land.
(iii) Collecting rocks.

Category 2

(i) Using appropriate irrigation techniques.
(ii) Controlled use of fertilizers, agricultural chemicals and hormones.
(iii) Using organic and green fertilizers, farmyard manure and compost.
(iv) Applying organic and good agricultural practices.

Category 3

(i) Formation of permanent vegetation.
(ii) Development of new pasture-meadow land and/or rehabilitating the existing ones.
(iii) Preventing overgrazing.
(iv) Growing feed plants.

The producers that stop their current productions and accept at least two of the categories above for three years are included under the scope of ÇATAK. The producers that choose the 1st category are paid 400 $/ha once a year. The producers that choose the 2nd category under the same conditions are paid 900 $/ha while those that choose the third category are paid 400 $/ha annually. 1048 producers in 4 cities (4060 hectares of land) were supported within the scope of ÇATAK at the end of 2008. Five provinces (Çanakkale, Kahramanmaraş, Karaman, Nevşehir, Niğde) were added into the ÇATAK project in 2009. ÇATAK payments have been made in two categories with the new arrangement. In the first category, the producers leaving the farm land uncultivated are supported with 400 $/ha a year. In the second category, the producers applying eco-friendly agricultural techniques are paid 900 $/ha a year.

In this study it is aimed to determine the common characteristics of the producers participating in ÇATAK

program and to search for the reasons behind their participation. At the same time, the conditions necessary for the expansion of environmentally friendly agricultural methods in Turkey have been discussed and recommendations made.

MATERIALS AND METHODS

The main material of the research consisted of the primary data derived from the surveys conducted on agricultural enterprises in Kırşehir Province. Additionally, results of previous research on the subject matter, records of various institutes and statistical data that were also used.

As the research area, Kırşehir province, one of the 4 provinces where ÇATAK program had started as a pilot project in 2006, was chosen. The project has been conducted in villages Seyfe, Gümüşkümbet, Yazıkınık and Eskıdoğanlı of Seyfe district in Kırşehir province. In collecting primary data for the research, the sampling method was used. The area under research included Seyfe, Gümüşkümbet, Yazıkınık and Eskidoğanlı villages. All of the 376 agricultural enterprises in these four villages comprised the frame of sampling. To represent them, 54 sample enterprises were selected using the Neyman Method, a stratified random sampling method, at the limit of 99% reliability and with a 10% error (Yamane, 1967).

For the determination of the relations between the variables determined at the stage of statistical analysis of the data gathered, Multi Correspondence Analysis Technique was used. Correspondence Analysis Technique is a technique related to multi variable statistical analysis techniques such as principal component analysis, factor analysis and multidimensional scaling. Therefore, correspondence analysis technique is a combination of multi variable methods and graphic methods (Dunteman, 1989). For this reason, it gives more explanatory information regarding to the subject in question. Multi Correspondence Analysis can be considered as an analysis of basic components, applied to the data obtained from p number of characteristics of n number of individuals, using categorical variables rather than continuous variables (Greenacre, 1998).

In other words, the main goal of the correspondence analysis technique is to reveal the dependence relationship between two or more categorical variables (the relationships between the variables and the levels of these variables). In the multi correspondence analysis part, the following variables were taken into consideration: benefiting from ÇATAK (Those benefiting = Yes (Y), Those not benefiting = No (N)), adoption of novelties (Those trying the novelties for the first time = Innovator (I), Those trying after others have already done = Late Group (LG), Those who do to want to try = Late Comer (LC), Those who do not have information = Uninformed (U)), membership to farmer organizations (Those who are members of a farmer organization = Member (M), Those who are not members of any farmer organization = Not member (NM)), education status of the producers (Those with an education level up to primary school level = Primary – (P-), Those with an education level above primary school level = Primary + (P+)) and land sizes of the enterprises (Those with a land size between 0 - 75 ha = 0 - 75, Those with a land size between 76 - 200 ha = 76 - 200, Those with a land size above 200 ha = 200+).

In order to apply, the Multi Correspondence Analysis, indicator matrix is formed. On the columns of this matrix appear the total level numbers of the variables in question (2+4+2+2+3=13), and on its rows appear the number of surveys (54). Thus, a matrix of a size of 54 x 13 is obtained (Gifi, 1990; Mendeş, 2002; Aktürk, 2004). In the analysis of the matrix, Burt Table composing of the inner products of this matrix or the matrix called Burt Matrix was used as basis (Gifi, 1990). All the necessary calculations were done using MINITAB statistical package program.

RESEARCH FINDINGS

In the research area, the average household size is 4.4 persons. The family size of the producers under the scope of ÇATAK is larger and 77.8% of these producers have a family size of 4 - 6 persons. Since environmentally friendly agricultural practices require more labour force, large families chose these practices. As seen from Table 1, while the rate of producers with a family size of 1 - 3 persons within all the producers under the scope of ÇATAK is 11.1%, this rate within the producers outside the scope of ÇATAK is 38.9%. In the research area, producers start agricultural production at young ages and their agricultural experiences are rather wide. The average age of the producers is 45.8 and the producers under the scope of ÇATAK are younger than others. 33.3% of the producers under the scope of ÇATAK and nearly half of the producers outside the scope of ÇATAK (44.4%) are above the age 50.

Literacy rate in Turkey in general is 87.3% and the education level of the producers in the research area is above the country average and the literacy rate here is 100%. It is expected that, with an increase in education level, an increase will be observed in sensitivity towards the environment. In the research area, the level of education of the producers who chose eco-friendly practices is higher. As seen on Table 1, the rate of secondary school graduates is 72.2% within the producers under the scope of ÇATAK, whereas the same is 30.6% within the producers outside the scope of ÇATAK.

In the research, the indicator formed for the analysis of the impacts of 5 categorical variables used in the application of Multi Correspondence Analysis Technique upon the state of benefiting from ÇATAK and the Burt Table (matrix) obtained by the inner products of the matrix are given on Table 2.

Diagonal elements of this matrix give the totals of sub categories of the five categorical variables examined. 33% of the producers benefit from ÇATAK. 8 of the 18 producers benefiting from ÇATAK (44%) are those trying the novelties for the first time, 9 of them (50%) are the producers trying the novelties after others have already done. 19 of the 36 producers who do not benefit from ÇATAK (53%) are those trying the novelties for the first time, and 12 of them (33%) are the producers trying the novelties after others have already done.

17 of the18 producers benefiting from ÇATAK (94%) are members of a farmer organization, while 30 of the 36 producers who do not benefit from ÇATAK (83%) are members.

It is seen that, there is a positive relationship between benefiting from ÇATAK and the level of education. While the education level of the producers benefiting from ÇATAK is above primary school level with a rate of 72%,

Table 1. Socio-economic status of the producers according to the preference for ÇATAK.

Socio-economic features	Under agro-environment programs		Outside agro-environment programs	
Age	**Number of respondents**	**Percentage**	**Number of respondents**	**Percentage**
1 - 20	2	11.1	1	2.8
21- 49	10	55.6	19	52.8
50-+	6	33.3	16	44.4
Education				
Primary school	5	27.8	23	63.9
Secondary school	13	72.2	11	30.6
Undergraduate	0	0.0	2	5.5
Size of household				
1 - 3 persons	2	11.1	14	38.9
4 - 6 persons	14	77.8	16	44.4
7-+persons	2	11.1	6	16.7

Table 2. Burt table.

	Benefiting from ÇATAK		Adoption of Novelties				Organization membership		Education status		Land Size		
	Y	**N**	**I**	**LG**	**LC**	**U**	**M**	**NM**	**P-**	**P+**	**0 - 75**	**76 - 200**	**200+**
Y	18	0	8	9	0	1	17	1	5	13	2	8	8
N	0	36	19	12	4	1	30	6	23	13	12	12	12
I	8	19	27	0	0	0	22	5	13	14	5	13	9
LG	9	12	0	21	0	0	20	1	10	11	6	6	9
LC	0	4	0	0	4	0	3	1	3	1	2	1	1
U	1	1	0	0	0	2	2	0	2	0	1	0	1
M	17	30	22	20	3	2	47	0	25	22	10	17	20
NM	1	6	5	1	1	0	0	7	3	4	4	3	0
P-	5	23	13	10	3	2	25	3	28	0	8	11	9
P+	13	13	14	11	1	0	22	4	0	26	6	9	11
0 - 75	2	12	5	6	2	1	10	4	8	6	14	0	0
76 - 200	8	12	13	6	1	0	17	3	11	9	0	20	0
200+	8	12	9	9	1	1	20	0	9	11	0	0	20

only 39% of the producers who do not benefit from ÇATAK have an education level above primary school level.

In the research area, average enterprise size is 209.9 ha; it is 283.7 ha for the producers under the scope of ÇATAK and 173 ha for the producers outside the scope of ÇATAK. It is seen that, the producers benefiting from ÇATAK are rather the producers with large lands. 2 of the18 producers benefiting from ÇATAK (11%) have lands between 0 -75 ha. There are 8 producers (44%) having lands of 76 - 200 ha, and again 8 producers (44%) having lands above 200 ha. For the producers who do not benefit from ÇATAK, land size categories show an equal distribution.

The analysis results of the matrix formed are given on Table 3. When Table 3 is examined, change amounts per each dimension within the total change (inertia) evaluated as the average measure of the change existing in the levels of the variables are seen. The shares of each dimension in explaining the total change is determined in percentages by comparing the inertia value of each dimension to the total inertia value.

It is determined as a result of analysis that the dimension with the highest explanatory rate is the 1st dimension (21.3 %). When articulate shares for explaining the total change are taken into consideration, it is determined that the share of the first and the second dimension in explaining the total change is 38.48%. In other words, when it is wished to be shown by a reduction to 2-dimensional space from 8-dimensional space existing between the levels of the variables examined, only 38.48% of the total change can be

Table 3. Analysis results of the matrix formed.

Dimensions	Change (inertia)	Rates of explanation of the total change by the dimensions	
		Of each dimension (%) (proportion)	Articulate share (%) (cumulative)
1	0.3421	0.2138	0.2138
2	0.2735	0.1710	0.3848
3	0.2280	0.1425	0.5273
4	0.2013	0.1258	0.6531
5	0.1797	0.1123	0.7654
6	0.1675	0.1047	0.8701
7	0.1149	0.0718	0.9419
8	0.0930	0.0581	1.0000
Total	1.6000		

Table 4. Weights of variable categories used in each dimension.

Variables/Categories		1st dimension (component 1)	2nd dimension (component 2)
Benefiting from ÇATAK	Yes	1.012	0.182
	No	-0.506	-0.091
Adoption of novelties	Innovative	-0.074	0.622
	Late Group	0.449	-0.437
	Late Comer	-1.733	-0.556
	Uninformed	-0.260	-2.700
Organization membership	Member	0.202	-0.198
	Not member	-1.356	1.332
Education status	Primary -	-0.468	-0.437
	Primary +	0.504	0.471
Land size	0-75	-0.962	-0.268
	76-200	0.055	0.725
	200+	0.618	-0.537

explained. Showing the relationships between the levels of the variables on a two-dimensional space is not sufficient in terms of explaining the total change. However, for the purpose of showing the interpretation of the results obtained, only two dimensions have been taken into consideration. Weights of the categories of the variables in each dimension, and contributions of each of the variable levels used to the dimensions are examined on Table 4.

The results obtained by this way can also be obtained by forming the multi correspondence analysis diagram. When Figure 1 is examined, it is seen that the producers benefiting from ÇATAK generally have high education levels. Besides, it can be said that enterprises benefiting from ÇATAK have enterprises with lands above 75 ha. Again, it is seen that the enterprises benefiting from ÇATAK are those trying the novelties for the first time, that is, they are enterprises called innovative.

It is seen that, the enterprises which do not benefit from ÇATAK and low level of education correspond to each other, that is, the producers who do not benefit from ÇATAK have low levels of education. Again, it is seen that those that do not benefit from ÇATAK correspond to the land size level between 0 - 75 ha, that is, the producers who do not benefit from ÇATAK generally have small lands. Besides, it is seen that, the producers who do not benefit from ÇATAK are enterprises which do not want to try novelties, that is, they are enterprises called late comers. For the issue of benefiting from ÇATAK, It is seen that the change of the variable of “membership to farmer organizations” does not have any impact upon explanation.

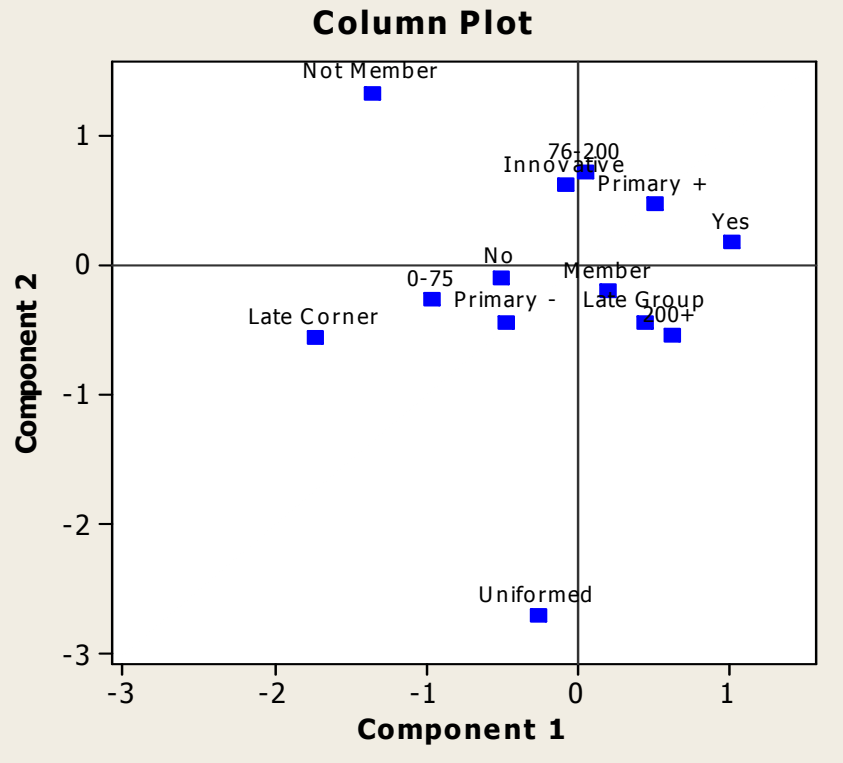

Figure 1. Multi correspondence analysis diagram.

In order to determine the attitudes of the producers under the scope of ÇATAK towards environment, questions related to the following issues were asked: whether they did crop rotation or not, whether they wished to pass to organic agriculture or not, whether they have soil analysis done or not, the information resource they take into consideration for drug use and what they did with pesticide and fertilizer packages after use. Table 5 was prepared according to answers given. All of the producers under the scope of ÇATAK apply crop rotation, which is very important for soil efficiency, 13.9% of the producers outside the scope of ÇATAK do not perform rotation. 66.7% of the producers under the scope of ÇATAK and 52.8% of the producers outside the scope of ÇATAK wish to pass to organic agriculture. In the determination of the amount of drugs to be used in agricultural combat, label information or abiding the suggestion of the agricultural organization is important in terms of environment. While 55.5% of the producers outside the scope of ÇATAK trust their own experiences while determining the amount of drugs they shall use without taking into consideration of label information of the drug and the recommendation of the agricultural organization, 77.8% of the producers under the scope of ÇATAK use drugs according to the label information of the drug or the recommendation of the agricultural organization. The rate of the producers using fertilizer after having soil analysis done is 33.3% for the producers under the scope of ÇATAK, and the same is 22.2% for the producers outside the scope of ÇATAK.

There is no significant difference between the behaviours of the producers with respect to destroying the packages of fertilizers and agricultural drugs and they generally bury the drug package under soil or burn it, showing similar behaviours. More than half of the producers expressed that they use fertilizer packages.

Conclusion

By using intensive capital per unit in order to increase efficiency in agricultural production, agriculture becomes intensified. While intensification in agriculture brings about efficiency increase, it has also brought various environmental problems.

Governments support producers for performing eco-friendly production in order to prevent the environmental problems caused by the agricultural sector. In Turkey, producers included under the Environmentally Based Agricultural Land Protection Program carried out in pilot areas have been given support payments since 2006.

According to the results of the Multi Correspondence Analysis conducted under the research, it is seen that, the producers choosing ÇATAK program generally have higher levels of education, larger enterprise sizes than other producers and generally, enterprises trying

Table 5. Attitudes of the producers towards choosing ÇATAK and the environment.

Attitudes towards the environment	Under agro-environment programs		Outside agro-environment programs	
Crop rotation	**Number of respondents**	**Rate**	**Number of respondents**	**Rate**
Performs rotation.	18	100.0	31	86.1
Does not perform rotation.	0	0.0	5	13.9
Wish to pass to organic agriculture				
Does not know organic agriculture.	0	0.0	5	13.9
Wishes to pass.	12	66.7	19	52.8
Does not wish to pass.	6	33.3	12	33.3
Information resource taken into consideration in agricultural disinfection				
Label	12	66.7	14	38.9
Self-experience	4	22.2	20	55.5
Opinion of the Agricultural Organization	2	11.1	2	6.6
Soil Analysis				
Does have soil analysis done.	6	33.3	8	22.2
Does not have soil analysis done.	12	66.7	28	77.8
What does she/he do with the drug packages after use?				
Buries under the soil.	3	16.7	7	19.4
Burns.	7	38.9	19	52.8
Leaves on the field.	4	22.2	5	13.9
Uses.	4	22.2	5	13.9
What does she/he do with the fertilizer packages after use?				
Burns.	7	38.9	10	27.8
Leaves on the field.	2	11.1	2	6.6
Uses.	9	50.0	24	66.6

novelties for the first time, that is, they are innovative enterprises.

It has been determined that the producers benefiting from ÇATAK are more sensitive towards the environment compared to other producers. The rate of fertilizer use during agricultural production process after having soil analysis done is higher for these producers compared to others. For agricultural drug use, 77.8% of the producers under the scope of ÇATAK and 44.5% of other producers use agricultural drugs according to the label of the agricultural drug or the recommendation of the agricultural organization. It has been observed that, the producers under the scope of ÇATAK showed a behaviour change being included under the program and that they are more sensitive towards environment.

It is important that, implementations are not limited to pilot areas and are applied in the country in general, in order that eco-friendly agricultural practices are expanded in Turkey. Supports given have been determined to be the most important factor upon the preference of producers for environmentally friendly practices.

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