

*Full Length Research Paper*

# Determination of the effective factors on organic olive cultivation decision

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**This research has been carried out to determine effective factors on decision making behavior for organic olive cultivation in the İzmir, Aydın and Çanakkale provinces where organic olive production is done intensively. Logistic regression method has been used for the determination of effective factors on decision making behavior of organic olive cultivation. Whether making or not making organic olive cultivation was considered as a dependent variable; individual characteristics, farm holding characteristics and sources of information were considered as independent variables in the model. It has been found that of individual characteristics (income), (type of land ownership) and of farm holding characteristics (machinery assets) are the significant factors on decision making for organic olive cultivation. The other significant factors are economic and environmental reasons in the model. It has been calculated that, the probability for farmers who use formal information sources to make organic olive cultivation is 333 times higher than that of the farmers who use informal information sources.**

**Key words:** Organic olive cultivation, decision making, logistic regression.

## INTRODUCTION

Organic farming is the process of producing a product by using environmentally friendly methods both in the production and processing phases. Accordingly, organic production covers all the processes, beginning from the production of the product to its delivery to consumers (Yazgan, 2006). Words such as organic (In England), ecological (in Germany) and biological (in France) are used as synonyms for organic farming (Demiryürek, 2004). Organic agricultural production which was mainly initiated in İzmir, Turkey in the mid-1980s, has become a nationwide production method used by 14.926 producers to produce 247 different products.

Turkey is one of the leading olive producers in the world. In terms of acreage, the number of trees and production amount, Turkey has a 10% share worldwide (Tzouvelekas et al., 2001; Anonymous, 2008; Willer et al., 2008). It has been seen that researchers studying on organic farming have generally tried to find out the

environmental factors which have an effect on shift to organic farming. In spite of this, it is hard to compare the studies on organic farming directly because the methods used in these studies, differ from one study to another. However, in the studies on organic farming, farm holding characteristics and economic reasons become prominent, as the factors influencing the decision to grow organically.

In a study carried out by Padel in 2001, it was pointed out that early studies on organic farming were about farm holding characteristics, farmers and environmental issues. In these studies, loss of soil due to soil erosion and environmental factors were shown to be important reasons for shifting to organic farming (Padel, 2001). Environmental protection factor was found to be more important than other factors in the studies done by Demiryürek (2000), Darnhofer (2005), Anderson et al. (2005), Fairweather (1999) and Tavernier (2003). Akin had found out in a study in 2008 that, the effect of environmental factors on the decision to grow organically is ranked number 3 among all factors (Akin, 2008).

In a study that Burton carried out with 237 organic vegetable producers in 1997, pointing out that the decision

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to shift to organic farming involves some economic reasons, he became one of the first researchers calling attention to the economic aspect of organic farming. In the same year, in a study that Olhan did in the province of Manisa, she emphasized that 57.5% of the producers growing conventionally wanted to grow organically, simply because they found it more profitable (Olhan, 1997). Moreover; Storstad and Bjorkhavg (2003), Gonzales and Nigh (2005), Hanson et al. (2004), Darnhofer (2005), they all pointed out that economic reasons were the leading factors in the shift to organic farming.

In organic farming implications, the effects of information sources are significantly crucial. Researchers have found that, lack of information is one of the major obstacles to shifting to organic farming (Morgan, 2000). As a result of the studies that Boz et al. (2005) and Boyaci and Karaturhan (2003) did, they stated that modern information sources (formal information sources) are hardly used by farmers. In the field studies done by Demiryürek (2000), Olhan (1997), Akin (2008), Burton et al. (1997) and Santucci and Antonelli (2004), it was stated that organic farming agencies, Provincial Directorate of Ministry of Agriculture, organic farming companies and research institutes are among the formal information sources that farmers use to learn about organic farming.

The aim of this study is to determine the differences between organic and conventional olive producers in the research area and to find out the factors influencing the decision to shift to organic olive cultivation.

## Literature review

The main aim of this study is to find out the factors influencing farmers' decision on shifting to organic farming. Finding out the factors will help improve the understanding about the diffusion of organic farming among olive producers and find out how this process can be supported.

### **Socioeconomic characteristics**

Although in organic farming, the role of women particularly in the decision making process has not been studied in detail yet, there are indicators showing that gender is an important factor influencing the decision on shifting to organic farming (Burton, 1997; Padel, 2001). Since all the respondents interviewed in the research area were men, in this study, gender as a variable which is one of the individual characteristics has not been taken into consideration (Table 1).

### **Information sources**

In the research area, organic olive cultivation is a new

agricultural production method which the farmers have replaced for conventional olive cultivation. In the adoption of organic olive cultivation by the farmers as an innovation, the information sources from which they have learnt about organic olive cultivation is important. 20% of the farmers growing olive conventionally, said that they had not heard about organic farming. 39.2% of them emphasized that they have heard of it from their relatives and neighbors. It can be said that, half of the conventional olive producers have no idea about organic farming or that they have heard about it through informal information sources.

On the other hand, organic olive producers have heard and learnt about organic farming from TARIŞ (Union of Taris Olive and Olive Oil Co-operatives) and Provincial Directorate of Ministry of Agriculture and Rural Affairs. 1.6% of organic olive producers pointed out that, they had learnt about organic farming from their relatives and neighbors. It has been found that the most important factor, to take a decision on organic olive production are the economic reasons (66%). Since economic reasons such as, organic olive pays more and the sale guarantee, come first for the farmers.

It has been found that economic reasons are followed by medical reasons.

## MATERIALS AND METHODS

The provinces of Çanakkale, Aydın and İzmir (where both organic and conventional organic olive cultivation is done) have been selected as the research area.

### Materials

The materials of this study consists of the data collected through survey method from farmers, who are producing organic and conventional olive in the research area. In the selection of the organic olive producers who would be interviewed within the context of this study, random sampling method was used. Of the 377 enterprises, 125 of them, which amount to 33.1% of the total enterprises, joined the study and a survey was carried out with the same number of olive producers (125), living in both villages and neighboring villages where organic olive cultivation is done. As a result, 250 samples show a distribution which match with the aim of the study.

### Methods

In scientific studies, to be able to detect the correlation between variables, some descriptive statistical methods are intensively used (Tonta, 1999).

When the number of independent variables is few, it is easy to establish a regression model and interpret it. However, the more independent variables are addressed to the model that is harder and more complex. The more variables are added to the model, the estimated standard error occurs and there are more dependents in the observed cluster. That is why, logistic regression is known to be an appropriate model, when other regression models fail to provide the necessary assumptions. Since logistic regression does not need multiple variable normal distribution, it is advantageous in

**Table 1.** Socioeconomic characteristics of organic/conventional olive producers.

Characteristics	Organic	Conventional
Age of farmer (year) (average)	49.1	50.1
Living in village (%)	81.6	86.4
Having non-agricultural income (%)	44.8	55.2
Elementary school graduate (%)	60	71.2
Income level	Medium-high	Low-medium
Farm size (ha) (average)	3.9	9.2

**Table 2.** Logistic regression analysis results.

Variables	B	S.Err	Wald	Sd	p	Exp(B)
Income			6.314	2	0.043	
Income (low)	-2.446	1.073	5.199	1	0.023	0.087
Income (moderate)	-1.124	0.800	1.974	1	0.160	0.325
Income (high)	0.00	0.00	0.00			1.00
Type of land (private property)	2.209	0.824	7.185	1	0.007	9.110
Type of land(private prop.+rental)	0.00	0.00	0.00			1.00
Tool machinery (none)	1.933	0.661	8.566	1	0.003	6.912
Tool machinery (possessed)	0.00	0.00	0.00			1.00
Source of info (informal)	-5.704	1.432	15.873	1	0.000	0.003
Source of info (formal)	0.00	0.00	0.00			1.00
Economic reasons (effective)	2.463	0.697	12.494	1	0.000	11.735
Economic reasons (ineffective)	0.00	0.00	0.00			1.00
Environmental reasons (effective)	-1.041	0.582	3.205	1	0.073	0.353
Environmental reasons (ineffective)	0.00	0.00	0.00			1.000
Legal info (no need)	2.865	1.026	7.795	1	0.005	17.550
Legal info (in need)	0.00	0.00	0.00			1.000
Invariant	-4.032	1.247	10.460	1	0.001	0.018

such implementations (Agresti, 2002).

In addition, the correlation between Odds value and the probability of occurrence of the event is expressed as either Odds =  $p/1 - p$  or  $p = \text{Odds}/1 + \text{Odds}$ . For instance, in cases where the Odds value is 1.00 or higher than 1.00, it is thought that the probability of occurrence of the event  $p$  has risen. In other words, it is accepted that, when the probability value is 0.5 or more, event  $p$  is believed to have occurred. However, to make sure that event  $p$  has really occurred, both Odds value must be 1.00 or higher than 1.00 and Wald statistics is scientifically significant. (Campbell, 1981; Hosmer and Lemeshow, 2000).

To summarize the assumptions belonging to logistic regression, there are 4 main assumptions:

- 1)  $y_i \in (0,1)$   $i = 1, 2, \dots, n$
- 2)  $y_1, \dots, y_n$  statistically independent which means observations are independent
- 3) There is a possibility of  $P(y_i = 1/x_i) = P_i$
- 4) There should not be linear dependence between independent variables. (Hosmer and Lemeshow, 2000; Cankurt et al., 2007).

### Logistic regression analysis

To find out the variables that could be effective in the decision to

grow olive organically, 11 variables have been selected. Considering both dependent and independent variables, logistic regression analysis has been made and a regression equation has been found. In step 5 where the analysis has been completed and the variables have been found, the verification has been found to be 97.6%. In group 1 (ones not growing olive organically) the verification ratio has been calculated as 96%, in group 2, (ones growing olive organically), it is 99.2%. The Nagelkerke R Square value of the model has been worked out as 0.846 and p value as 0.181. To find the factors that are influential in organic olive cultivation decision, the logistic regression model was established. The findings are given in Table 2.

According to the model analysis starting with all the variables ( $p < 0.10$ ), the significant variables are income level, type of land ownership, agricultural machinery assets, the information source from which the farmers have learnt about organic farming, economic factors on whether or not the farmers grow olive organically, environmental factors on whether or not the farmers grow olive organically and the farmers' need of information, related legal regulations regarding organic farming.

Income is a variable regarding individual characteristics. The fact that the coefficient of the income variable is negative shows that, there is a negative correlation between the probability of growing olive organically and income. Since the ratio of probability (Exp(B) is smaller than 1, this variable decreases the probability of growing

olive organically. The probability of occurrence of an event, which comes from logistic regression hypothesis is the opposite improbability of occurrence of the event.

According to the model result, when a high income group is taken as a reference point (income (3), the probability of organic olive cultivation by the farmers in the moderate income group is (1/0.325) 3.07 times less than that of the farmers in the high income group. The organic olive cultivation by the farmers in the low income group is (1/0.087) 11.5 times less than that of the farmers in the high income group.

Type of Land Ownership is a variable regarding enterprise characteristics. It has been found that compared to the reference group (private property + rental land), the probability of organic olive cultivation by the farmers having only private property is 9.11 times higher. Agricultural Tool-Machinery Assets is a variable regarding farm holding characteristics. According to the model result, probability of organic olive cultivation by the farmers having agricultural tool-machinery assets is 6.912 times higher.

Source of information is a variable belonging to the farmers' information source. It represents both formal and informal information sources from which organic farming has been acquired. The fact that the coefficient of the variable has a negative value reveals that, there is a statistically negative correlation between the probability of growing olive organically and information source. It can be said that the probability of organic olive cultivation by the farmers who have learnt about the term organic farming through informal sources is (1/0.003) 333.33 times less than that of the farmers having learnt about it through formal sources.

Economic reasons represent the variables including the financial factors the farmers have stated, as the reasons why on whether or not they grow olive organically. Since economic reasons have an effect on organic olive cultivation, they increase the probability of deciding to grow olive organically 11.735 times.

Environment represents the variable including the environmental factors the respondents have stated, as the reasons why on whether or not they grow olive organically. In the model, compared to the reference group (environmental factors are not effective) the probability of organic olive cultivation due to environmental factors is (1/0.353) 2.83 times more.

Legal Information is a variable representing the respondents' need of information on all the legal regulations particularly on organic farming. The fact that information is needed on legal regulations related to organic farming increases the probability of organic olive cultivation 17.55 times when compared to the fact that information is not needed.

## RESULTS

As a result of logistic regression analysis, it has been found that the most important factors in organic olive cultivation are the economic reasons and the source of information. An innovation can be adopted among farmers, if it offers significant advantages. These advantages can be visible in terms of raising environmental awareness and economic issues. In the research area, it has been found that economic reasons (premium, high organic olive price and incentive payment) are influential factors in organic olive cultivation. In this sense, improvement of marketing opportunities to make high profits from organic olive cultivation and the increase in incentive payment given by the government (especially, in the process of shifting to organic olive cultivation) may result in the proliferation of organic olive

cultivation more in the area.

It has been detected that in addition to the influential economic reasons in organic olive cultivation, environmental protection factors like soil preservation and being environmentally friendly are effective. However, it has also been detected that this effect decreases the probability of organic cultivation in organic olive production. It can be said that as far as use of pesticides and the adverse outcome in environmental and natural resources are concerned, the farmers rely on only their own observations and these issues haven't been fully understood.

Agricultural information is as crucial as soil, water and seed are to farmers. Farmers get this piece of information through formal or informal information sources. It has been found that when producers decide to grow olive organically, they get information through formal or informal sources.

According to the regression analysis, It has been detected that the probability that the farmers who get information through formal sources do organic olive cultivation is (1/0.003) 333.33 times higher than that of farmers getting information through informal sources. Although organic farming is a knowledge based production method, it can be stated that, the farmers in the research area, make use of informal information sources. Therefore, making promotion programs on organic farming will not be much effective in the shift to organic olive cultivation. Initially, having the farmers comprehend the importance of information on organic farming, take the responsibility of getting information to some extent and bear the costs of organic farming partially, are the most important points to consider.

Another result that emerged in the research area is that the farmers both in organic and conventional olive cultivation business emphasized that, they are in need of information on legal regulations. It has been found that the probability that the farmers who are in need of information on legal regulations, do organic olive cultivation is 17.55 times higher than that of the ones who do not need information on it. This need in the area can be met, if a number of leaflets, books and posters regarding legal regulations on organic farming, are distributed to the farmers by companies and the Ministry of Agriculture and Rural Affairs, which is responsible for organic farming nationwide.

The research area has its own limits and it is impossible to generalize the study results for all producers. However, since an explicit model regarding organic farming was introduced in this study, the results elicited in the study can offer an insight into the development of organic farming policies and the design of promotion programs.

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