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An Economic Analysis of Organic and Conventional Olive Production: Case of Turkey

Organik ve konvansiyonel zeytin üretiminin ekonomik analizi:
Türkiye örneği

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ABSTRACT

With this paper, economic analysis of conventional and organic olive production is examined in case of Turkey. Based on a questionnaire survey of 62 farmers from both organic and conventional systems, this paper aims to clarify the cost and returns of organic olive farming in comparison with conventional production system. According to paper results; variable costs in organic production is 4710.9 €/ha and 2503.1 €/ha in conventional olive production. Organic farms have 263.8 €/ha loss while conventional farms make 81.7 €/ha profit in terms of gross margin. Olive production cost is calculated in organic as; 1.98 €/kg and 1.97 €/kg in conventional production.

ÖZET

Bu çalışmada organik ve konvansiyonel zeytin üretiminin ekonomik analizi Türkiye örneği ile incelenmiştir. Hem organik hem konvansiyonel sisteminden 62'şer çiftçi ile yapılan ankete dayalı bir alan çalışmasının gerçekleştirildiği bu çalışmada, organik ve konvansiyonel zeytin tarımının maliyet ve getiri yönünden karşılaştırılarak bir değerlendirme yapılması amaçlanmıştır. Bu çalışmanın sonuçlarına göre; zeytin üretiminde değişken masraflar organik üretimde 4710.9 €/ha, konvansiyonelde ise 2503.1 €/ha'dır. Brüt marj açısından; konvansiyonel işletmeler hektar başına 81.7 € bir kar sağlarken, organik işletmeler 263.8 € zarar etmektedir. Zeytin üretim maliyeti organik üretimde 1.98 €/kg, konvansiyonelde ise 1.97 €/kg olarak hesaplanmıştır.

INTRODUCTION

The origin of the olive is not known but is speculated to be Syria or possibly sub-Saharan Africa. For more than 6000 years, the cultivated olive has developed alongside Mediterranean civilizations and is now commercially produced on more than 23 million acres (9.4 million ha) in the Mediterranean basin (Vossen, 2007).

In Turkey organic farming grew rapidly paralel to consumers' choice and demand growth in importer countries. In 1986 only 8 products were being produced organically, but in 2006 production of organic agricultural products gained new dimension and the number of products rise to 210 farmers to 8.854 and

total production area to 162.131 ha (EPC,2007). In last decade olive and olive oil are the products that organic production grow rapidly. Especially, paralel to rise in awareness of healthy diet in developed countries, this product gained more importance. Most of organic olive cultivation is carried out in 80.016 ha area in Tunisia, Syria follows this country with 5000 ha and Turkey with 3.776 ha (Santucci, 2007; TURKSTAT, 2007).

During the period 2003-2006, the number of organic olive producer raised from 469 to 1183, production area from 1534 to 5716 ha and organic olive production from 6456 to 13116 tones in Turkey (MARA,2007).

Few studies that were carried out to date have analysed costs and returns with regard to organic olive-growing farms. Tzouvelekas et al. (2001) found that family farm income (computed as gross revenues, plus land rent, plus family labor, plus interest on variable costs minus total cost) for organic olive growers was 4.6% lower than that for conventional olive-growers. They also state that lower profit margins and restrictions on the types of inputs permitted may have forced organic producers to be more cautious regarding the use of their inputs. Cisilino and Madau (2007) carried out a "distance analysis", in order to identify some of the main differences between organic and conventional farms. Their study aims to highlight some of the main characteristics of those two groups of farms to better address differences (if any) in production technology, costs and revenues. Cisilino and Madau found that looking at the average values on Invested Areas, conventional olive growing farms' Gross Production was significantly higher than the organic ones, as the Net Margin, as the Net Product and Costs. They state that the two groups are quite similar and that, even if organic farms still produce a lower "economic value", they better compensate productive factors, especially in terms of Labour Force.

With this paper, economic analysis of conventional and organic olive production is examined in case of Turkey.

MATERIALS and METHODS

The basic material for this study is comprised of primary data obtained in a survey carried out in 2007. In terms of the number of producer and production area and also production quantity the organic olive is produced intensively in Aydın, Çanakkale and İzmir provinces of Aegean Region. These three provinces include 93.12% of organic olive oil producers, 86.49% of total production area and 90.14% of production quantity in Turkey. In this area 609 organic olive farms has been determined. The sample size is determined by using proportional sampling method (Newbold, 1995).

$$n = \frac{Np(1-p)}{(N-1)\sigma_{\hat{p}}^2 + p(1-p)}$$

n: Sample size; N: number of farms; p: The percentage of farmers who grow organic olives (taken

as 0.50 to reach maximum sample size); $\sigma_{\hat{p}}^2$: variance. According to the proportional sampling method, with a 90% confidence interval and 10% margin of error, the required sample size was found to be 62.

Conventional olive farm sample is not calculated and the sample size is determined 62 as in organic producer. In order to compare the efficiency accurately, different area is not considered for conventional olive producers, cities and villages where organic olive producers interviewed are considered.

Production cost is discriminated as variable cost and fixed cost in this paper. Variable costs include land cultivation, utilized temporary labour costs, fertilization, disinfection and harvest costs. Fixed costs are organic production certification costs, land rent, general administrative cost and depreciation (Erkuş, et.al, 1995; Inan,2001). General administrative costs are 3% of total fixed costs (Açı, 1980;Engindeniz, 2003). 10% value of building, machine and equipment is accepted in calculating depreciation (Erkuş, et.al 1995; Inan, 2001). Current capital interest is equal to half of the variable costs of farms. Current capital interest applied to half of the enterprises' variable costs is accepted as half of the annual interest; 17.5%, carried out by T.C Agricultural Bank (Kırıl, et al, 1999).

RESULTS

Socio-Economics Characteristics of the Olive Growing Farms

The average cultivated area is 6.75 ha and the share of the olive plantation land in the total farm area is 68.31% in the organic farms. The average cultivated area is 5.26 ha and the share of the olive plantation land in the total farm area is 71.93% in the conventional farms. The household size of the organic and conventional farms is approximately 4 people. The average age is 55 years and average education level is 6 years for the farmers in organic farms. The average age is 58 years and average education level is 6.2 years for the farmers in conventional farms. The 95% organic farmers and the 65% conventional farmers are the members of the cooperatives. The 83.40% of cooperatives members of organic farmers and the 32.50% of cooperatives shareholders of conventional farmers are partner of Olive and Olive Oil Agricultural Wholesale Cooperative (TARIS).

Olive and Olive Oil Production in the Farms

Beside organic enterprises' organic production, when their conventional production and plantations in transitional stage are considered, it's determined that they produce more than conventional farms (Table 1 and Table 3). It seems that both organic and conventional olive farms significantly utilise their olive as oil (Table 2 and Table 3).

Table 1. Olive usage in organic olive growing farms

	Olive production (Kg/farm)	Olive Usage (%)		
		Sold	Table Olive for self consumption	Olive for Olive Oil Process
Organic	15751.13	5.77	3.99	90.24
Transition Period	177.90	4.53	0.28	95.19
Conventional	1516.13	-	5.69	94.31
General	17445.16	5.26	4.10	90.64

Table 2. Olive oil usage in organic olive growing farms

	Olive Oil production (Kg/farm)	Olive Oil Usage (%)		
		Sold	Self consumption	Stock
Organic	3328.02	84.03	6.75	9.22
Transition Period	40.32	64.00	36.00	-
Conventional	235.08	87.31	2.74	9.95
General	3603.42	84.02	6.82	9.16

Table 3. Olive and olive oil usage in conventional olive growing farms

Olive Production (Kg/Farm)	12382.10
Sold	8.73
Olive Usage (%)	Home Consumption*
	0.98
	Olive for Olive Oil Process
	90.29
Olive Oil Production (Kg/Farm)	2442.29
Sold	45.66
Olive Oil Usage (%)	Home Consumption
	10.47
	Stock
	43.87

*self-consumption

Costs, Gross Production Value and Gross Margin of Organic and Conventional Olive Farms

Olive production cost, in organic and conventional farms, is almost the same. Olive production cost is calculated as 1.98 €/kg in organic and 1.97 €/kg in conventional production (Table 4 and 5). In a study which was done in Australia (Beckinham and O'Malley, 2007), conventional olive production cost

determined is 2.87 \$/kg. In Greek (Tzouvelekas, et.al,2001), olive production cost is calculated as 4.69 \$/kg in organic and 4.05 \$/kg in conventional production. The most important cost element is labour cost used in harvest. Intensive labour is used due to no intensive mechanization and harvesting of olives with sticks. This causes quality problems in harvested olives.

When selling prices are examined in both type of olive farming, it is determined that farms sell their olive below the unit cost of production (Table 6). Both kind of production, organic and conventional, have loss, but the lost of conventional production is bigger than organic farms. Olive production cost is almost more than twice of the olive oil selling price. This loss can be related with considering also nominal costs when making cost calculation in agriculture. As it is known, these costs does not reflect actual cost but they are also involved in costs by equivalence value for some cost items. They are farmer and farmer's families' labour, land rent. Having no alternative, because of utilizing his and his families' labour, most of the producers continue producing despite this negative scenario. In a study which was done in California-USA (O'connel, et al, 2005), olive net loss calculated is 0.32 \$/kg.

According to Gross Margin Analyses, gained by subtracting variable costs from gross production value, there is an observable difference between organic and conventional olive farms. Especially, it's remarkable that; variable cost per ha in organic olive production is higher than conventional olive production. In fact variable cost per ha is 4710.9 € for organic production and 2503.1 € for conventional production (Table 7). This difference is due to controlled olive farming in organic production (maintenance, harvest etc). Thus, conventional olive farming take place mostly in mountain slope and it's carried out mostly without big maintenance cost. Mann-Whitney U Test shows that in terms of Gross Production Value per ha and paid variable costs, there is a significant difference between organic and conventional olive farms. When Gross Margin is compared, it seems that organic olive farms lose 263.8 € per ha and can conventional olive farms conversely make 81.7 € profit per ha.

Table 4. Olive production cost in organic olive growing farms (2007)

	Labour and Fuel (€/ha)		Utilised Material		Total Cost (€/ha)
	Labour Cost	Fuel Cost	Type	Material Cost (€/ha)	
1)LAND CULTIVATING					
Subsoiling	100.5	174.1			274.6
Disk Harrow	31.9	43.2			75.1
2)MAINTENANCE					
Land Preparation	52.1	168.8			220.9
Hoe cultivation and Cleaning	214.7	27.6			242.3
Pruning	508.1	13.3			521.4
Fertilizers	180.1	75.1	Farm Manure, Green Manure and Prepared Organic Manure	420.1	675.3
Irrigation	45.9	233.0	Water	26.5	305.4
Organic pesticide	57.3	103.6	Organic Control Material	65.9	226.8
3) HARVEST	1770.4	43.7			1814.1
4) OTHER					
Material used in harvest			(canvas, sack, basket, bin exc.)	87.4	87.4
Other Relevant Costs			Worker transport , food expense exc.	267.6	267.6
Current Capital Interest (Enterprise Cost/2* %17,5)					412,2
5)TOTAL VARIABLE COST					5123.1
Organic Certification Cost					12.8
General Managerial Expenses (5X%3)					153.7
Farm Rent					3788.8
Depreciation (Building+ Machine and Equipment)					516.5
Facility Cost Amortization					309.9
6) TOTAL FIXED COST					4781.7
7)TOTAL PRODUCTION COST					9904.8
8) By Product Income (-)					440.0
9)Olive Production Quantity(2005)					7261.4
10)Olive Production Quantity (2006)					2286.4
11) Average Olive Production Quantity (kg/ha) (9+10)/2					4773.9
12) 1 kg olive cost (7-8)/11					1.98

Table 5. Olive production cost in conventional olive growing farms (2007)

	Labour and Fuel (€/ha)		Utilised Material		Total Cost (€/ha)
	Labour Cost	Fuel Cost	Type	Material Cost (€/ha)	
1)LAND CULTIVATING					
Subsoiling	59.9	120.3			180.2
Disk Harrow	31.7	43.7			75.4
2)MAINTENANCE					
Land Preparation	50.5	44.8			95.3
Hoe cultivation and Cleaning	100.1	78.1			178.2
Pruning	203.0	23.6			226.6
Fertilizers	85.1	14.3	Farm Manure, Chemical Manure and Prepared Organic Manure	268.2	367.6
Irrigation	28.3	27.6	Water	244.1	300.0
Pesticides	40.0	19.3	Chemical Pesticide Material	122.0	181.3
3)HARVESTING	780.5	23.9			804.4
4)OTHERS					
Material used in harvest			(canvas, sack, basket, bin etc)	58.7	58.7
Other Relevant Cost			Worker transport, food expense etc.	35.4	35.4
Current Capital Interest (Enterprise cost/2 * %17,5)					219.0
5)TOTAL VARIABLE COST					2722.1
General Managerial Cost (5X%3)					81.6
Farm Rent					3739.3
Deprecion (Building + Machine and Equipment)					355.6
Facility Cost Deprecion					213.4
6) TOTAL FIXED COST					4389.9
7)TOTAL PRODUCTION COST					7112.0
8)By Product Income (-)					127.3
9)Olive Production Quantity (2005)					2135.3
10)Olive Production Quantity (2006)					4969.7
11)Average Olive Production Quantity (kg/ha) (9+10)/2					3552.5
12) 1 kg olive cost (7-8)/11					1.97

Table 6. Unit selling price, unit cost and net profit/loss in organic and conventional olive growing farms

	Organic Olive	Conventional Olive	Difference (%)
Unit Selling Price (€/kg)	0.93	0.73	27.40
Unit Cost (€/kg)	1.98	1.97	0.51
Net Loss (€/kg)	-1.05	-1.24	

Table 7. Gross production value, variable costs and gross margin in examined organic and conventional olive growing farms

	Organic Olive	Conventional Olive	Mann-Whitney U Test	Asymp. Sig. (2-tailed)
Gross Production Value (€/ha)	4447.1	2584.8	1159,000	*,000
Variable Costs (€/ha)*	4710.9	2503.1	1331,000	*,000
Gross Margin (GPV –VC)	-263.8	81.7	1987,500	,386

For (significant value) < 0,05 is significant.

* not included current capital interest

CONCLUSION

So far, it seems that organic olive producers are younger, more organized and receive information easier. The main problems in both production type are high costs mostly because of harvest labour, lands

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which are not proper for machinery used and harvest still being done with stick. Despite high expenditure in organic production, producers' tendency to pass this production type can be related with expectation of increasing demand of organic production and guaranteed market.

Results reveal that looking at the variable cost items in olive production cost, organic olive growing farms' variable costs are significantly higher than the conventional ones, especially in terms of Labour Force. Due to organic olive growing farms have a lower "Gross Margin", they should better compensate productive factors, especially in terms of harvest labour force. Organic olives should be harvested by mechanical harvesting in preference to hand or stick to reduce both the labor cost and the risk of damage fruit.

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