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Organic Raisin Production: A Comparative Analysis of Organic and Conventional Smallholdings in Turkey

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Abstract: This study compared productivity, profitability, producer-defined constraints and goals and research priorities between organic and conventional raisin farms in Turkey. The raisin yield of the organic farms was 8% lower than that of the conventional farms in research period. Variable costs and production costs per hectare was higher on organic farms. According to lower yield and higher costs, net income per hectare was 16% lower than conventional raisin farms. On the other hand, if current organic certification costs paid by firms were included, the price premiums paid to organic producers would have to increase to 22.4% in order to equal the net incomes from conventional raisin. Conventional farmers identified low and unstable prices as the main constraints for sustained production and stated further intensification of production as their main goal. Organic farmers have centered on farm diversification and agronomic practices that permit organic farm management.

Key words: Net income, organic farming, organic premiums, raisin, variable costs

INTRODUCTION

In recent years, unconscious utilization of both agricultural chemicals and fertilizers have caused to occur poor quality and harmful products to human health as well as the increase of crop production. Reaching phosphorus and nitrate leaking into the deep of soil to fresh water sources resulted in serious problems in terms of human, domestic animal and wildlife. Also, agricultural chemicals have accumulated in the soil and destroyed ecological balance by affecting crop health negatively. Against these negative conditions, of the countries having high income level at first, in a lot of countries the organized producers and consumers being conscious prefer producing and consuming safe agricultural products produced with friendly methods to nature. With this aim, organic farming has occurred as a new production style. In this concept, organic agriculture is a production system which provides continuity in soil fertility, controlling the diseases and pests with biological struggle and forbids the usage of chemical inputs and also advises organic and green fertilization, crop rotation and soil protection and becomes its all processes under control as well and where the crops produced are certificated. Organic agriculture is not derelict of a product after sowing or planting with out any application or not a turn of the primitive production system. On the contrary, it is an agriculture type which is based on the ideas towards future needs and requires attention, knowledge and self-sacrifice.

The organic agriculture in Turkey has shown a fast progress with the demand of foreign trade companies since 1986. From 1986 to 2005, production areas have increased from 1000 to 57,001 ha, the number of organic farmers increased from 313 to 18,385 and the number of organic product increased from 8 to 92 as well ^[1-3]. Furthermore, the amount of organic products exported has also raised parallel with increasing of production amount. In 2003, Turkey's total organic product exports were 21,083 and 5,677 tones of which was raisin^[4,5].

Almost, half of the world grape production was obtained in Europe. Sixty five million tones grapes were produced throughout the world in 2004. While Italy has got the first row with 13% share in world grape production, France 12%, Spain 11%, USA 8% and Turkey 6% follow this country, respectively. USA 45%, Turkey 26% and Iran 13% are outstanding countries in raisin production. Productivity shows variations years by years on account of depending on weather conditions generally. A great majority of total raisin production has been exported. Total raisin export realized 643,000 tones annually during 1999-2003 periods. While Turkey had the greatest share in total raisin export with 203,000 tones annually, Iran and USA followed this with 118,000 and 108,000 tones, respectively in the same period^[6].

Organic grape production has realized in limited countries in the world. Among these countries, USA, Turkey and some EU countries such as France, Italy and Germany have the most important place. There are

58,100 ha organic vineyards in USA and 65,000 ha in EU countries^[6,7]. However, especially in EU countries and USA organic grapes are produced towards wine production. Turkey which have produced and exported organic raisin since 1986 is the leader of organic raisin production in the world. It may be said that raisin export of Turkey depending on production amounts has increased year by year. While very few producers and the limited amount of raisin production realized in 1986, now almost 10,000 tones organic raisins were produced by 900 numbers of producers from 2,100 ha vineyard plantation^[4].

While growing markets for organic produce, particularly in EU countries, suggest that organic agriculture can be economically viable, little is known about the productivity and profitability of organic raisin production systems. There are a lot of researches carried out in USA and EU countries about economic results of vineyard management^[8-10]. Nevertheless, cost and income analyses were done only in either production system. Of these so-called researches only one is resemble with the aims of the study, but this was a study carried out on table grapes^[11]. In Turkey, it is seen that only two comparative studies in terms of productivity and costs were done^[12,13]. The objective of the present study was to compare organic vs. conventional raisin farms in Turkey in terms of their productivity, labor use, production costs, net income, farmer-perceived constraints, farmer-defined goals and research needs for the future.

MATERIALS AND METHODS

Selection of case study farms and data collection: This study was carried out in Aegean Region of Turkey in 2003-2004 production year. The production of organic raisin on average is 10,000 tones in Turkey. About 94% of this production is obtained in İzmir and Manisa Provinces^[4]. The number of organic raisin producers is 900^[1]. The exact list of all organic raisin producers was obtained from Research, Planning and Organization Department of Ministry of Agriculture and Rural Affairs (MARA). On this list, the farms having a history of at least three years under organic management were determined (selected farms actually ranged from 4 to 17 years). In Turkey, while some of the farms converted the whole farm in to organic farming, the others were inclined to organic agriculture only in certain production activities. This situation causes the increasing of sample variance. Therefore, according to vineyard area taken into account as sampling criteria determining sample size from the population was made by stratified random sampling method. The formula was used below^[14].

$$n = \frac{N \cdot \sum N_h \cdot S_h^2}{N^2 D^2 + \sum N_h \cdot S_h^2}$$

Where, N_h is the number of producers in the h^{th} stratum, S_h^2 is the variance of h^{th} stratum, D^2 is the value of $(d/t)^2$, d is the quantity of error permitted from the population mean and $t = 1.96$ in response to 95% confidence limit.

The list of conventional farmers in the villages where the organic farmers were was obtained by field visits. From this population, sample size of conventional farmers was determined by the same sampling method. Each population is divided into two strata which had 1-5 ha vineyards and more than 5 ha vineyards. Total 44 farms on organic group and 38 farms on conventional group were determined randomly as sample size. In the study, in comparing with groups, the values of the average of groups were taken into consideration.

On farms studied, accounting records do not exist. Although the most crucial materials to be supplied the sufficient and reliable data in agricultural economics researches are farm records, data gathered by surveys are also to be suitable and dependable method in case these records do not exist^[15]. In the study, the survey used in order to collect data from the producers was formed by discussing with experts of this subject. The pre-test of questionnaire forms prepared was done in some local areas. Therefore, the application of survey forms was both facilitated as sufficiency provided for the aims of study.

Data were collected for 2003-2004 production year via repeated semi-structured interviews with producers and corroborated with farm visits and review of records of the companies which the crop was sold to. The three-year yield data (2002-2004) were questioned by being thought to be differences in raisin productivity, depending on weather conditions during years.

In addition, the studies and statistics concerning with the subject and research area of some organizations such as Agricultural Directorates of İzmir and Manisa Provinces, Farmer's Chamber, agricultural input suppliers, Raisin Sales Cooperative and İzmir Commodity Exchange were also utilized.

Productivity and profitability evaluation: Gathered as a consequence of doing questionnaire, data to determine the cost of organic and conventional produced raisin, farmers' selling prices, the productivity and profitability of crop in question, the usage level of labor, machinery, farm manure, chemical fertilizers and pesticides were analyzed.

For the analysis of organic agriculture to producer welfare, partial budget analysis was done^[16]. Total production costs and unit cost of product were calculated

by being added variable costs with fixed costs such as depreciation, interest, management, maintenance etc. Productivity was calculated from interviews with farmers. Since vineyard density differed in some cases between conventional and organic farms (ranging from 1600 to 2040 plants ha⁻¹), yields were expressed only on a per-area basis. Farm net income from raisin production was calculated as Gross Product Value (GPV) minus production costs. Gross margin was calculated as GPV minus variable costs.

Besides, the unit cost of product was calculated by being divided total production costs per hectare in to average yield per hectare.

In organic raisin production, the necessary expenditures of organic certification were paid by the firms and cooperative buying product and farmers did not render any payment. The indicators such as net income per hectare, per unit product and per hour's labor were calculated in the study.

Estimated costs of certification and inspection of organic production per farm were based on current national fees. Inspection costs consist of day rate, accommodation and traveling costs of inspector. Organic certification and inspection costs per hectare vineyard plantation were calculated by dividing the total organic certification and inspection costs paid by the firm to total vineyard plantation areas allowed for, by considering of organic farmers taking the certification by individual. This cost is estimated as US \$ 250 ha⁻¹.

Producer-defined constraints, goals and research priorities: In order to complete the three year production and management data and get insight into the farmers' perspectives, the producers were asked to describe the main constraints for sustained raisin production, what their goals were for the future and what research they considered essential to alleviate these constraints.

RESULTS

Characteristics of farms and raisin production processes: Average farm size was 12.8 ha on organic farms, which was bigger than the average of conventional farms. Both farm groups, fruit production have come first. On average farms size, the share of orchards was more than 60% in both groups. On the other areas grains are usually grown.

Thirteen organic farms from 44 farms whose data were obtained were converted into organic production system as a whole. On organic farms, organic production was done 32% of average farm size. Among the crops produced organically except for viticulture, olive and

Table 1: Average farm size and vineyard on organic and conventional farms in Turkey

Indicators	Organic	Conventional	Organic/ Conventional ×100
	Mean±SE	Mean±SE	
No. of observations (n)	44	38	-
Average farm size (ha)	12.8±3.1	10.4±1.8	123
Average size of vineyard (ha)	3.5±2.8	3.1±1.0	119
Marketing rate of raisin (%)	96.3	93.8	103

Table 2: Average yield of raisin on organic and conventional farms in Turkey

Year	Organic	Conventional	Organic/ Conventional ×100
	Mean±SE	Mean±SE	
2001/02	4,015.2±351.1	4,536.3±284.8	89
2002/03	3,882.1±436.5	4,146.8±395.9	94
2003/04	3,806.5±355.4	4,122.7±296.7	92
Mean	3,901.3±400.2	4,268.6±314.6	91

other fruits become available. Of the products which have not got organic certificate in addition to not being used the chemicals grains, cotton and maize existed.

There are differences between the ratios of marketing raisin which farms produced. While on organic farms 96.3% of raisin was sold, this ratio was 93.8% on conventional farms (Table 1).

Even though there are hardly ever differences between production processes applied on organic and conventional raisin production, it may be found a difference in terms of repetition of the processes (pest control, irrigation etc.). On both production systems, the pruning was done in December and January. Between March and June, rows in vineyards are cultivated by plough and disc-harrow.

While the numbers of cultivations applied changes 8-12 on conventional farms, on organic farms this number is less. Digging up vine stocks and hand hoeing are done twice in the period between March and July. The pesticide applications are made between February and July and while it is done 7 times on organic farms, this number may be going up to 12 times on conventional group. While irrigation is made generally twice, it can be said that the conventional farms irrigate more as number. In viticulture, harvest and drying are made nearly in the same technique in both production systems in August and it is only known that organic farmers pay more attention to drying process.

Raisin productivity: In 2003-2004 production years when the cost and income analysis were done, the average raisin yield was 3,806.5 kg ha⁻¹ on organic farms which was 8% lower than that of conventional farms. In three-year data, whereas, organic raisin yield was also less than conventional raisin yield, this ratio reached to 9%. In both groups, the highest yield was obtained in 2001-2002 production year.

Table 3: Average labor use for raisin production of organic and conventional farms in Turkey

Activity	Organic groups		Conventional groups	
	Labor use (ha)	Proportion of total labor (%)	Labor use (ha)	Proportion of total labor (%)
	Mean±SE	Mean	Mean±SE	Mean
Cultivation	20.7±1.4	2.5	37.7±1.3	4.7
Pruning	123.0±4.8	14.7	117.7±4.2	14.6
Fertilization	39.3±6.4	4.7	16.0±0.6	2.0
Green manure crop ^a	17.6±0.5	2.1	- ± -	-
Pest control	49.0±2.7	5.8	63.1±3.4	7.8
Hand hoeing	37.6±8.2	4.5	29.5±2.9	3.7
Irrigation	36.5±3.1	4.4	44.5±1.8	5.5
Thinning	69.8±8.8	8.3	63.2±4.2	7.9
Harvesting	219.5±7.5	26.2	226.5±4.6	28.1
Carrying	27.3±2.4	3.3	27.6±2.9	3.4
Drying ^b	94.3±16.5	11.2	88.9±9.9	11.0
Classification and packing	40.4±4.1	4.8	38.3±2.2	4.8
Other ^c	62.6±5.5	7.5	52.4±4.1	6.5
Total	837.2±37.8	100	805.4±20.2	100

^aVetch is used as green fertilization crop. This figure shows the labor use of sowing and mixing of vetch seeds. ^bIncludes the labor use of processes such as dipping grapes in to compound of olive oil and potassium carbonate, laying out grapes to truckle-beds and drying. ^cIncludes labor used for carrying and attaching branches after pruning

Table 4: Economic performances of raisin production of organic and conventional farms in Turkey

Indicators	Organic	Conventional	Organic/ Conventional
	Mean±SE	Mean±SE	×100
Average yield (raisin) (kg ha ⁻¹)	3,806.5.0±84.8	4,122.7±93.1	92
Output (GPV) (\$ ha ⁻¹)	2,744.0±231.3	2,802.7±224.5	98
Variable cost (\$ ha ⁻¹)	1,213.8±154.1	1,120.6±107.5	108
Production cost (\$ ha ⁻¹)	1,839.0±267.0	1,723.1±238.3	107
Unit cost of product (\$ kg ⁻¹)	0.48±0.3	0.42±0.2	114
Gross margin (\$ ha ⁻¹)	1,530.2±241.7	1,682.1±208.5	91
Net income (\$ ha ⁻¹)	905.0±126.5	1,079.6±144.1	84
Net income per unit product (\$ kg ⁻¹)	0.24±0.04	0.26±0.06	92
Net income per hours labor (\$ h ⁻¹)	1.08±0.3	1.34±0.3	81

Costs and input use: Variable costs of raisin production are given in Fig. 1 for both groups. These costs were classified as labor cost for harvest and drying, labor cost for plantation management, chemical fertilizer cost, farm manure costs, pesticides costs and other material costs.

When the costs of organic certification and annual inspector were not taken into account, total variable cost per hectare was calculated US \$ 1,213.8 on organic farms, US \$ 1,120.6 on conventional farms in 2003-2004 production year. The predominant cost in both systems was labor for harvest and plantation management. On average, the conventional group spent more money on harvesting (a cost directly proportional to productivity), whereas, the organic farms spent more on labor for plantation management, including weed and pest control, fertilization, pruning, irrigation and cultivation (Fig. 1).

The share of machinery and other material costs in total variable costs was higher on conventional farms than that of organic farms. On organic farms, one point drawing attention in terms of the distribution of variable

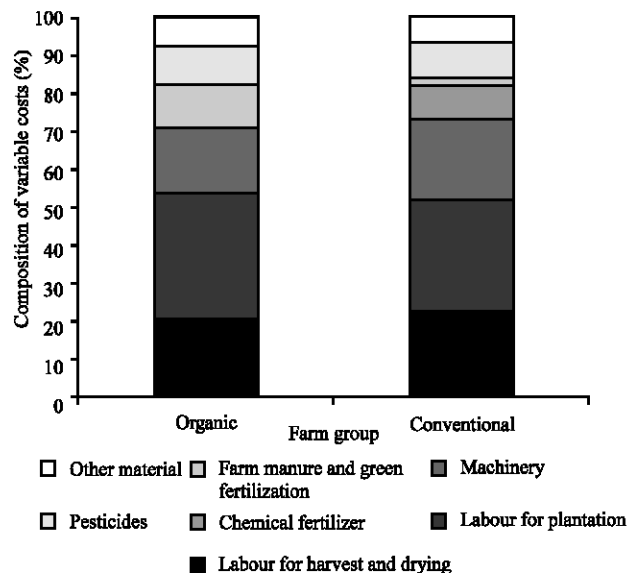


Fig. 1: Mean distribution of variable costs of raisin production of organic and conventional farms in Turkey in 2003

costs is that the cost of pest control was higher than that of conventional farms. Total labor use for raisin production was 837.2 h ha⁻¹ on organic farms, which was 4% more than that of conventional farms (Table 2). The production process demanding labor force the most was harvest with 219.5 h ha⁻¹ and pruning, drying followed, respectively. The three production processes in question got 51% share in total labor use.

Total labor use was determined as 805.4 h ha⁻¹ on conventional farms. Harvest process got 28.1% share in total labor use. Pruning and drying followed this process 14.6 and 11%, respectively (Table 3).

Table 5: Premium prices for organic raisin required to make the adjusted net income of organic farms equal to that of conventional farms in Turkey (2003-04)

Reference price (conventional)	Price received (organic)	Price required (organic)	Present organic premium	Required organic premium
(US \$ tones raisin)*			(Percentage above the price received by conventional group)	
680	721	832	6.0	22.4

*US \$ = 1.401.275 Turkish liras, September 2004

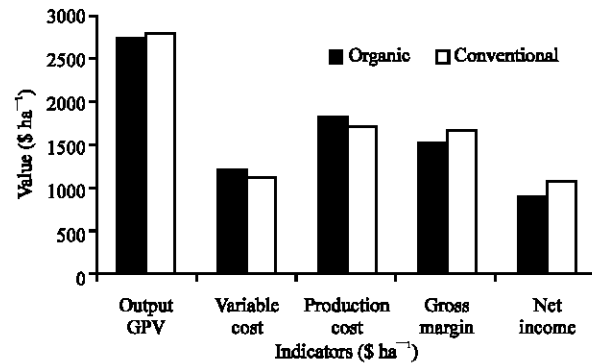


Fig. 2: Net income of raisin production of organic and conventional farms in Turkey in 2003-2004, US \$ 1 = 1.401.275 Turkish liras, September, 2004

While pest control, irrigation, harvest and cultivation need more in terms of labor use per hectare on conventional farms, organic farms need much more labor in the rest of processes. Especially, the more usage of manure on organic farms and more intensive labor use on the stages such as carrying and distribution of manure explained that the total labor use was more on organic farms. However, the fact that the hand hoeing is paid more attention and green fertilization is done on organic farms is a factor of which increases labor use.

Net income and product prices: GPV obtained from raisin on organic farms was US \$ 2,744.0 ha⁻¹ and this value was relatively higher on conventional farms with US \$ 2,802.7 ha⁻¹ (Table 4). The fact that the average yield was less and total variable cost was higher on organic farms caused that gross margin became lower than the conventional farms.

When we evaluate the topic in terms of net income, it is seen that net income on organic farms was 16% lower than that of conventional farms (Fig. 2). Net income per unit product on conventional farms (US \$ 0.26 kg⁻¹) was higher than on organic farms (US \$ 0.24 kg⁻¹). Net income per hours labor on conventional farms was 19% higher than organic one.

Average raisin selling price on organic farms was US \$ 721 tones and the range was between US \$ 675 and US \$ 785 tones. On conventional farms, this value was 6% lower with US \$ 680 tones on average. The range in conventional raisin prices was between US \$ 642 and US \$ 714 tones. If current costs for organic certification,

inspection and registration paid by firms were included in the organic farm budgets, the price premiums received by organic producers would have to increase to, on average, 22.4% above conventional raisin prices in order to generate a similar net income for organic producers as for conventional ones (Table 5).

Producer-defined constraints, goals and research priorities: Both producer groups identified low and unstable raisin prices as the major limitation to sustain raisin grapes production. The organic farmers considered that the premium prices offered were lower than a competitive market rate since there was not a serious yield variation between organic and conventional farms. Low incomes from the conventional farms forced the producers into a loan and debt cycle and/or to minimize investment in production. The latter effect of low incomes was also true for many of the organic farms, where low investment hindered the development of the organic systems in terms of diversification and biomass production, leading to a lack of on-farm recyclable organic material on several of these farms - a factor mentioned as a major constraint by many organic producers.

Future farm goals of both groups focused on increasing farm output. While conventional farmers have envisioned achieving this through further intensification, the organic producers focused on increasing organic fertilizer, nutrient cycling and soil conservation as means of improving farm performance.

The research topics suggested by the conventional producers focused on alternative marketing and stabilization of the international raisin market to control low and fluctuating prices. While the topic of marketing was also suggested by organic producers, the topics most frequently mentioned by the organic group related to organic raisin production techniques, particularly geared towards weed and pest prevention/control and nutrient management.

DISCUSSION

Production processes and characteristics of farms: Organic raisin farms made more effort in struggle with diseases and pests faced on vineyards. The fact that organic preparations used for diseases have been relatively expensive than other pesticides affected the profitability of production negatively.

As a result of avoiding cultivating the soil so much on organic production, it will be a factor that increases labor costs that the labor are used more especially on hand hoeing for weed control.

Raisin productivity: Yield variations on organic farms were more than those of conventional farms. This situation has originated that some organic farms have not used farm manure very much and not done green fertilization. It may be get 8% lower yield than conventional raisin yields on current farm manure usage amount (6.9 tones ha⁻¹) in order to compensate decreased yield level on account of their not using chemical fertilizers. Green fertilization was done in 59% of organic farms.

Costs and labor use: More labor use and higher fertilizer and pesticides costs per hectare become effective that the variable costs on organic farms were higher than those of conventional farms. Since organic farmers pay more attention to some production processes (hand hoeing, pruning, drying etc.) labor costs are more than conventional farms. Average cost of cow vetches used on green fertilization and farm manure on organic farms was US \$ 126.4 ha⁻¹. Even so, the value of chemical fertilizers and few farm manure used on conventional farms was only US \$ 78.2 ha⁻¹.

On average, 438 kg chemical fertilizer per hectare was used on conventional farms, which was equivalent to 78.9 kg nitrogenous (N), 112.4 kg phosphorus (P) and 2.8 kg potassium (K) in terms of plant nutrition element.

The fact that cultivation and irrigation processes were done more intensively on conventional farms explained that energy requirement was more than organic farms. Although 168.8 L fuel was used on conventional farms, this amount was only 102.0 L ha⁻¹ on organic farms.

Net income and prices: Organic certification, inspection and annual registration costs were not included in the calculation of net incomes since they were not directly paid by the organic farmers in the years studied. Actually, the organic farmers are not aware of the costs of organic certification, inspector and annual registration. The firms buying raisin have offered 10% higher level of conventional raisin price existing in İzmir Commodity Exchange. Even so, it was seen that the prices given to organic farmers were not nearly 10% higher than that of conventional farmers (Table 5). If current costs for organic certification, inspection and registration paid by firms were included on the organic farm budgets, the price premiums received by organic producers would have to increase to, on average, 22.4% above conventional raisin

prices in order to generate a similar net income for organic growers as for conventional growers (Table 5). The premium received by organic producers will depend on the buyer, the quantity and quality of raisin. The number of firms buying organic raisin is 23, one of which is cooperative and the others are private firms. Thirty nine of organic farms studied are marketing their products to private firms and the other 5 of organic farms are marketing to cooperative. Raisin buying prices of firms are lower than the cooperative prices. Therefore, it was calculated that 5 organic farms marketing their products to cooperative had higher net incomes than the other organic farms. Although cooperative has bought the raisin from higher prices, the main reason why the producers (especially conventional farms) choose private firms who have bought at lower price level is that the private firms have purchased the product in cash. The cooperative paid the money in a 50 day-period. This situation is one of the basic factors that limited business activities of cooperative in the market.

Producer-perceived constraints, goals and research priorities: For both farmer groups, marketing of raisin represented the biggest issue. Most conventional producers considered low and unstable prices as the main limiting factor. The focus of the majority of organic producers on production issues illustrates the general lack of basic information about the ecology of organic systems and the currently inadequate or completely missing extension support for organic farmers. The goals of the conventional farmers focused on increasing farm output through further intensification. In contrast, the goals of the organic farmers focused on increasing diversity, organic matter, nutrient cycling and soil conservation.

CONCLUSIONS AND RECOMMENDATIONS

Organic farming utilizing land and capital more productive and evaluating inactive labor force on small households and not using chemicals will be a considerable alternative activity and income source for smallholdings. In addition, in terms of income and environmental sensibility of consumers, it is regarded that the improvement of organic farming is useful. Under these circumstances, it is necessary that the economic performance of organic crop production should be searched at first to improve national production and marketing policies towards organic farming system. In the study, this subject is focused on.

Despite lower mean yield and slightly higher variable costs for the organic group, the difference in net income

between the organic and conventional producers was minimal mainly because of the premium prices paid for organic raisin.

Getting organic certification by farmers own can be an important factor to increase their bargaining power in the market. Organic farming system applied as contract farming in the beginning have been carried out by private firm's directions up to now. On the other hand, all sorts of costs related to organic certification of farmers covered by firms are resulted that the farmers are more and more dependent on firms. Marketing their product to any firm must be possible for farmers. Therefore, farmers should get their organic certification and some supports should be provided by the government for covering certification costs. In the contrary case, firms will continue to be able to purchase organic raisin by offering only 10% higher price than the conventional ones.

Although every farmer is the member of Raisin Sales Cooperative (TARIS) in research area, organic farmers also should organize one another in order to get organic certification economically and more bargaining power.

However, considering the investments needed to develop farms according to organic principles ensuring that organic farm net incomes merely match conventional farm net incomes may not be sufficient to motivate further conversion to organic systems. Higher income for organic production may also be desirable in a policy context as an incentive for farmers to reduce environmental externalities due to unsustainable practices of conventional production. It is reasonable to argue and increasingly accepted; that present generations (consumers and society at large) should pay the real price of production, a cost that otherwise is passed on to future generations in the form of contaminated and degenerated natural resources.

According to study results, lower yields and net incomes for organic raisin farms can reduce the adaptation ratio of organic production system with other producers. In order to improve organic farming and increase the welfare of producers, some arrangements for input subsidies used on organic farming should be done and producers should be supported especially in conversion period like in EU countries.

Both farmer-and researcher-controlled studies are needed to assess the effects of biophysical and agronomic factors on vine health and productivity and to increase our knowledge about the ecology of organic raisin systems. Further research is needed on biological options to control vineyard pests and diseases. Furthermore, studies to compare the productivity of alternative management systems along agro-ecological gradients from marginal to optimum conditions for vine

could help establish guidelines as to where organic production would be more likely to have a comparative advantage. Another research is needed on possibilities of cooperation among organic farmers.

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