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GENERAL CHARACTERISTICS OF VINEYARD FARMS IN DENİZLİ PROVINCE

Ayşe KARADAĞ GÜRSOY[1], Mevlüt GÜL[2], M. Çağla ÖRMECİ KART[3]

[1]Iğdır University, Faculty of Agriculture, Department of Agricultural Economics, Iğdır, Turkey, Email: ayse_karadag@yahoo.com
[2]Isparta Applied Sciences University, Faculty of Agriculture Sciences and Technology, Department of Agricultural Economics, Isparta, Turkey, Email: mevlutgul@isparta.edu.tr
[3]Ege University, Faculty of Agriculture, Department of Agricultural Economics, İzmir, Turkey. Email:caglaormeci@yahoo.com

Corresponding author: ayse_karadag@yahoo.com

Abstract

Grapes produced in many provinces of Turkey, with the possibility to evaluate in different ways and also as an agricultural product which is also an important contribution to foreign trades. According to the latest data, Turkey ranks in fifth regarding the total vineyard area and sixth in grape production in the world countries. This study aims to reveal the economic analysis of grape production. In this framework, determining the economic structures, annual activity results of vineyards, and calculating the production costs in the case of Denizli province. It was determined that grape production mostly made in aqueous conditions and goble training production was done in non-irrigated vineyards. Because of this situation, according to the wired training vineyards, it was found that the yield was about 1.6 times higher than the goble training system. It was determined that the labour force was used intensively in both production systems. However, more labour was used in the wired training vineyards than in the goble training system. It was determined that the gross production value be higher in the wired training vineyards. According to these results, it can be said that the wired training system was more advantageous regarding economic criteria.

Key words**:** *viticulture, economic analysis, production cost, labour cost*

INTRODUCTION

Viticulture in Turkey, provide the most favourable climates, as well as the gene centre of the vine, has extremely old and well-established culture of viticulture. The history of the viniculture in Anatolia is quite old, and the archaeological excavations confirm that the viniculture existence about 3500 BC. The inclusion of shapes and reliefs on grapes were the most important indicators of the culture of viniculture in the region. That the relevant figures and reliefs made with grapes in archaeological excavations in Turkey, indicating that the widespread of viticulture are the most important indicators. Indeed it has been found important prehistoric artefacts related to the vineyard during the excavations conducted in all regions in Turkey [10]. Turkey is stated as one of the higher ones in the potential of the world in grape production [1] [11]. Grapes produced in many provinces of Turkey, with the possibility to evaluate in different ways and also as an agricultural product which is also an important contribution to foreign trades. Briefly, viticulture, agricultural production is an important area for Turkey. 2017 statistics show that, Turkey ranks in the 5th regarding the vineyard area and 6th in grape production in the world. This study aims to reveal the economic analysis of grape production. In this framework, determining the economic structures, annual activity results of vineyards, and calculating the production costs in the case of Denizli province. Denizli Province covers 9.77 percent of Turkey's vineyard and carries 11.27 percent of the production alone. These number shows that Denizli province is an important location for grape production. In this study, it was aimed to compare the goble training system and wired training grape production systems economically. Within the scope of the study, crop pattern, average

vineyard size, production structures, economic indicators such as gross production value and gross profit for the production period were interpreted according to the production system. According to the literature in Isparta province, studies were comparing the wired and goble training systems economically which were done by [17]. The findings obtained from this study were thought to allow to compare the profitability of investment in two provinces.

MATERIALS AND METHODS

The data obtained from the grape producers in the villages of Denizli Province. The data were obtained from face-to-face interviews using a pre-prepared questionnaire. Also, various statistics, research reports, theses and papers were used as secondary data sources. In 2017; 4.2 million tons of grapes were produced in Turkey, and 11.25% of this quantity was covered by Denizli [18]. In the selection of villages, the villages that were thought to represent the research area according to the officers whose working in the Ministry of Agricultural and Forestry. While determining the number of producers interviewed in the study, the following proportional sample volume formula was used.
If the size of the population was unknown,

$$n = t^2 pq / d^2$$

where:
n: Sample size
p: Probability of occurrence
q: 1-p (or probability of incidence)
d: accepted ± sampling error rate
t (α, sd): The critical value of t table according to the degree of freedom at the level of α significance.
Accordingly, 95 percent confidence interval and a 10 percent margin of error sample size were calculated as 96 producers. Data were gathered from producers by face-to-face surveys. The villages included in the study and the numbers of producers interviewed in these villages were given in Table 1. 52.1% of the interviewed farms had wired training grape production, and 47.90% of them had goble training system. When the distribution by districts was examined, it was seen that all of the vineyards in Buldan district produce with the wired training system.

Table 1. Numbers of interviewed producers in research districts

District	Goble		Wired	
	Frequencies	%	Frequencies	%
Buldan	-	-	48	100.00
Çal	33	94.30	2	5.70
Çivril	13	100.00	-	-
Total	46	47.90	50	52.10

Source: own calculation

The results of the face-to-face interviews were first transferred to the computer and were presented as a table with the help of various statistical package programs. These data were interpreted by using the cross-table, arithmetic and weighted averages method. Single product budget analysis method was used to determine production costs. Accordingly, the income-cost situation was calculated only for the grape, not for all crops grown in the interviewed farm. The labour force and machinery power included in the production cost in the grape production shows the amounts used in various operations. These amounts were given in hours. The calculation of the family labour wages was based on foreign labour costs in the research area. The amount of pesticide used in grape production was given as active ingredients. The amount of fertiliser used in grape production was given as the amount the sum of plant nutrients. In case of partial budget analysis, unit machine rental prices were taken as a basis in case producers use their machines. As a result of the grape production, the gross product value was calculated by multiplying the amount of crop and the sales price. Gross profit was calculated by subtracting the variable costs from gross production value [15][17].

RESULTS AND DISCUSSIONS

Table 2 contains the general characteristics of the interviewed producers. The average was 49 years, the education period was seven years, and the agricultural experience was 26 years. According to the production technique,

it was determined that the goble training systems' grape producers be older and less educated, but their experience period was more than that of the wired training system. It was seen that the farm households were composed of four people.

Table 2. Farmers' characteristics according to the production in interviewed farms

Characteristics	Goble (N=46)		Wired (N=50)		Total (N=96)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Farmers age (year)	54.67	10.29	44.48	9.72	49.36	11.18
Farmers education (year)	6.33	2.49	7.60	3.16	6.99	2.91
Household population (person)	3.96	2.26	4.06	1.17	4.01	1.77
Agricultural experience (year)	31.09	13.08	21.46	9.34	26.17	12.26

Source: own calculation

In Table 3, the distribution of land ownership and the land structure was given in goble training system grape production. The interviewed farms have 7.15 hectares of land with an average of 9.15 plots, 48.85 percent of the lands dedicated to viticulture, 48.71 percent allocated to fields crops, 2.31 percent were covered by horticulture, and the rest of it belongs to the vegetables. The own property was widespread and constitutes 46.68 of the total cultivated land in the interviewed goble training production vineyards. Another important finding was the determination of the rental land in the production of field crops. According to the results, farms have 5.10 hectares of dry land and 2.05 hectares of irrigated land. For this reason, it can be said that producers were able to produce without irrigation or to plant crops with low water demand.

Table 3. The land presence and tenure in interviewed farms according to the goble training system

Crop pattern	Goble (N=46)							
	Plot	Own	Rented	Mutual	Irrigated	Non-irrigated	Total	%
Vineyard	0.58	3.03	0.40	0.07	0.35	3.15	3.49	48.85
Field crops	0.28	1.46	1.98	0.04	1.53	1.95	3.48	48.71
Horticulture	0.05	0.17	0.00	0.00	0.16	0.00	0.17	2.31
Vegetables	0.01	0.01	-	-	0.00	0.00	0.01	0.12
Total	9.15	4.67	2.38	0.11	2.05	5.10	7.15	100.00

Source: own calculation

In Table 4 the distribution of land ownership and the land structure was given in wired training system grape production. The interviewed farms have an average of 6.51 hectares of land consisting of 4.74 plots. The fact that the vineyard production area was higher than the goble training vineyards this can be interpreted as an indication that the grape production was the primary source of income and commercial purpose. Similarly, wired training vineyards have larger land, and this was another important indicator. The most important finding was that the amount of irrigated land in these vineyards was very high both in grape production and other agricultural activities compared to goble training producing farms. According to the structure of the land, it was determined that the farms produce on average 6.06 hectares of irrigated land and only 0.45 hectare of dry land.

Table 4. The land presence and tenure in interviewed farms according to the wired training system

Crop pattern	Wired (N=50)							
	Plot	Own	Rented	Mutual	Irrigated	Non-irrigated	Total	%
Grape	3.98	4.9	0.1	0.4	5.4	0.1	5.5	83.92
Field crops	0.38	0.3	0.4		0.5	0.1	0.7	10.24
Horticulture	0.38	0.2	0.2	0.2	0.1	0.2	0.4	5.84
Total	4.74	5.4	0.6	0.5	6.51	0.4	6.6	100.00

Source: own calculation

Table 5 shows the distribution of land ownership in all the interviewed farms. In the Denizli region, 6.8 hectares of land was owned by an average of 6.82 plots, while 66.2 percent was owned to viticulture. The fact that the vineyard production area was higher than the other agricultural activities in the examined farms can be interpreted as an indicator that grape production was the primary source of livelihood and for commercial purposes. Similarly, the fact that the land amount was too high was another critical indicator. When evaluated according to the structure of the land, it was determined that the farms produce an average of 4.1 hectares of irrigated land and only 2.7 hectares of non-irrigated land.

Table 5. The land presence and tenure in interviewed farms

Crop pattern	Total (N=96)							
	Plot	Own	Rented	Mutual	Irrigated	Non-irrigated	Total	%
Grape	4.84	4.0	0.3	0.3	3.0	1.6	4.6	66.29
Field Crops	1.52	0.9	1.1	0.0	1.0	1.0	2.0	29.59
Horticulture	0.42	0.2	0.1	0.0	0.1	0.1	0.3	4.07
Vegetables	0.04	0.0	-	-	0.0	0.0	0.0	0.06
Total	6.82	5.1	1.5	0.3	4.1	2.7	6.8	100.00

Source: own calculation

Some of the features of interviewed and information about interviewed producers were presented in Table 6 according to the grape

production system. According to Table 6, 24 percent of the farms were also deal with livestock activities. It was determined that 47.8 percent of the farms engaged in dairy cattle breeding and 47.8 percent were engaged in feeder cattle breeding. According to the grape production technique, it was seen that animal husbandry was higher in goble training vineyards. It was determined that the state of training related to agriculture or viticulture in goble training vineyards be higher than wired training production.

Regarding owning non-agricultural income, 46.9 percent of the producers were found to be another source of income other than agriculture. As an income source, 55.6 percent of the non-agricultural producers were retired, 26.7 percent of them work as civil servants or contract workers, and the remaining 17.8 percent were tradesmen. According to the grape production structure, 52.2 percent of the goble training vineyards and 42 percent of the wired training vineyards have non-agricultural income. The most crucial point that attracts attention here was that 79.2 percent of the vineyards which have non-agricultural income in the production of goble training were retired, and 47.6 percent in wired training vineyards were public officials or contract workers. It can be said that the average age of producers in goble training vineyards was ten years higher than those producing wired training system. The average annual income from the non-agricultural activities of the interviewed producers was determined to TRY 6,936.42. This figure was calculated as TRY 6,932.96 for the goble training vineyards and TRY 6,939.60 for the vineyards engaged in wired training production. The ownership and use of the computer of the interviewed producers were examined and the distribution according to their production structure was given in Table 6. According to the survey, 43.8 per cent of the grape producers in the research area had computers, and only 36.5 per cent of them used computers. It was found that the rate of computer ownership and computer use was higher in the producers of wired training production. The fact that the producers producing in the wired training system were younger than goble training growers can be explained as the reason why they use the technology more.

Regarding computer use, 39.6 percent of the producers use the internet, and it was found that the rate of internet use was much higher in the wired training system producers. Producers stated that they use the internet for agricultural purposes as a second for game purposes. Only 16.7 percent of producers were reported to have the habit of buying newspapers, it seems quite a low level, but the reading rate was 45.8 per cent, which was indicating that producers have the opportunity to read in the village coffee shop or where they go. According to the grape production technique, when reading habits and reading habits were examined, it was determined that producers who produce goble training vineyards read a regular newspaper more.

Table 6. Livestock breeding, education and non-agricultural income in interviewed farms

	Goble		Wired		Total	
	N	%	N	%	N	%
Livestock breeding status	15	32.6	8	16.00	23	24.0
Dairy cattle	9	60.0	2	25.0	11	47.8
Feeder cattle	5	33.3	6	75.0	11	47.8
Other animal activities	1	6.6	-	-	1	4.4
Training of viticulture or agriculture	11	23.9	5	10.0	16	16.7
Status of having non-agricultural income	24	52.2	21	42.0	45	46.9
Retired	19	79.2	6	28.6	25	55.6
Civil servant or contract worker	2	8.3	10	47.6	12	26.7
Tradesmen	3	12.5	5	23.8	8	17.8
Average non-agricultural income (TRY)	6,932.96		6,939.60		6,936.42	
Ownership of computer	13	28.3	29	58.0	42	43.8
Use of computer	11	23.9	24	48.0	35	36.5
Having the habit of buying newspapers	9	19.6	7	14.0	16	16.7
Regularly reading newspaper rate (%)	26	56.5	18	36.0	44	45.8

Source: own calculation

The distribution of the grape varieties preferred by the interviewed producers was given in Table 7. Production was carried out with more than one variety in the vineyards. There were many varieties of grapes with local names. The most preferred Sultani Seedless grape was a standard grape variety with a good yield. The bunches were of medium size (300-400 g) and normal frequency. The grains were small (1.2-1.8 g), green-yellow, thin-skinned [3]. It matures in mid-season, and its yield varies between 5-10 tonnes ha^{-1} [9]. It was determined that 80.21 percent of the interviewed grape producers cultivate Sultani Seedless grapes. According to the production system, this ratio was seen as a highly preferred rate of 98 per cent, especially in wired training production. The

Razaki grape varieties, which were known as Anadolu Razaki, Karaburun Vine, Rezaki, Rosaki, have a larger bunches (400- 500 g), conic and infrequent branches. The grains were yellowish light green and large (5 g), long elliptical and 2 - 3 cores, sweet and odourless. The yield per hectare varies between 10-16 tonnes. Harvesting time begins at the end of August - beginning of September [9]. It was determined that 47.92 percent of the grape interview producers raise this variety. According to the production system, especially in wired training system grape producers preferred this variety with the rate of 76 per cent. Çalkarası was a type of grape used both as fresh and wine [13]. Çalkarası Denizli was one of the black varieties of local wine of our country, especially grown in Çal district and its name was taken from this district. Grains were of medium size, an ellipsoidal shape, fleshy and juicy grape variety [7]. It was determined that 14.58 percent of the interviewed grape producers cultivate this variety. It was seen that this type has a higher share with the ratio of 26.09 percent in the goble training system where the vineyards were located in Çal District. Red Globe was a new kind for Turkey, and it can be used in fresh export. It harvests in a late season. The bunch was conical, very large (1,000 g) and full grain. Grain was purplish red round, very coarse (12-14 g), 3-4 cores [12]. Results shows that 11.46 percent of the interviewed producers preferred this variety. According to the type of production, it was determined that this ratio be more preferred especially in wired training vineyards. Chamomile was hazy grey-black colour, the grains were large (6 g) and elliptical, the crust thickness was medium, the sweet flavoured, bunches were conical and large (450-550 g) [8]. Chamomile was harvesting late, at the end of September and mid-October [4]. According to the findings 10.42 per cent of the producers grown this grape variety in their vineyards. It was determined that this type be preferred only in goble training vineyards. Alphonse Lavallee was a 3-4 seeded, grape-tapered conical, coarse (550-600 g), full-grain grape variety. Grain was purplish black, flattened round and coarse (7-9 g). The harvesting period was in the middle season [12]. The study shows that 6.25 percent of the grape farmers prefer this grape variety. According to the type of production, it was determined that this ratio be more preferred in wired training vineyards. İri kara (Large black) was mostly cultivated in Eskişehir region with conic shaped rounded black grains [5]. According to the results in the research area 5.21 per cent of grape producers preferred this variety. According to the type of production, it was determined that this type be preferred in goble training vineyards. Mevlana was a variety for fresh consumption; the average bunch weight was 470 g, white grains, very large (7 g), elliptical shape. It matures at the end of August [9]. It was determined that 4.17 percent of the interviewed grape producers have this type. According to the type of production, this variety only found in the wired training production. Superior was a seedless fresh, also known as Sugraone. The bunches were large (470 g), frequent or very frequent. The grains were green-yellow, coarse (5 g), short oval and seedless. The yield per hectare was medium (12-14 tonnes). It was an early variety that harvests in late July [9]. It was determined that 4.17 percent of the grape interview producers have this type. According to the type of production, this type was seen only in wired training vineyards. Siyah Üzüm (Black Grapes) known as Siyah Parmak (black finger), functional female flowering, medium grain (346 g) and the bunches were medium-large, black colour, cylindrical grain, 2-core, fresh variety [14]. It was determined that 2.08 percent of the grape interview producers have this type. According to the type of production, this variety was only found in goble training vineyards. Apart from these, a small number of producers have also mentioned other grape varieties, such as white, Aşı Kara and Kona, which were their local names but have not been included in the study since there was no information available in the literature. Regarding grape production system wired training vineyards preferred market/ commercial varieties which have a higher market share such as sultana, Razaki, Red Globe.

Table 7. Grape varieties in the interviewed vineyards

	Goble		Wired		Total	
Grape varieties	N	%	N	%	N	%
Sultani Seedless	28	60.87	49	98.00	77	80.21
Razaki	8	17.39	38	76.00	46	47.92
Çalkara	12	26.09	2	4.00	14	14.58
Red globe	2	4.35	9	1,8.00	11	11.46
Chamomile (Öküzgözü)	10	-	-	-	10	10.42
Alphonse Lavallee	**1**	2.17	**5**	**10.00**	**6**	**6.25**
İri kara (Large black)	4	8.70	1	2.00	5	5.21
Mevlana	-	-	4	8.00	4	4.17
Süper yol (Superior-Sugraone)	-	-	4	8.00	4	4.17
Siyah Üzüm (Black Grape)	2	4.35	-	-	1	2.08

Source: own calculation

In order to obtain more quality and healthy products; the need for fertiliser, fertiliser, application method should be determined correctly. Increasing the use of fertiliser will also play an essential role in meeting the plant nutrient requirements by reducing the risks. Measures to increase fertiliser efficiency were essential both regarding the product, environmental and economic aspects [2]. Effective and balanced fertilisation with other necessary cultural processes in the vineyards improves the physical, chemical and biological structure of the soil; as well as the development of the plant ever year by regenerating plant nutrients into the soil [16][19]. For this reason, in order for the development of vineyard usually, it was necessary to return the nutrients that it removes from the soil every year to the soil. Vineyards were fertilised with both organic and inorganic fertilisers [6]. The fertiliser types, the average amount of fertiliser and hectare costs were given in Table 8 according to the production system. When evaluated in total, it was determined that the producers use 244.9 kg 15-15-15 fertiliser, 187.9 kg animal manure, 82.3 kg powder sulphur, 68.8 kg Diammonium Phosphate and 62.3 kg 33 percent ammonium nitrate per hectare regarding quantity.

Regarding the monetary value of fertilisers it was determined that the examined vineyards have the highest fertiliser cost per hectare was TRY 308.6 in 15-15-15 fertiliser, following by TRY 162.1 sulphur, TRY 83.2 potassium sulphate, TRY 72.9 Diammonium Phosphate, TRY 67.5 urea and TRY 66.7 33 per cent ammonium nitrate. Also, small amounts of ammonium sulphate, organic fertiliser, potassium sulphate, chicken manure, eco-9, 20-20-0, 26% ammonium nitrate, root fertiliser and potassium nitrate were used in the vineyards. In wired training vineyards, it was determined that the producers use 255.9 kg 15-15-15 fertiliser, 89.8 kg powder sulphur, 82.2 kg Diammonium Phosphate and 61.4 kg 33 percent ammonium nitrate per hectare regarding quantity. Regarding the monetary value of fertilisers it was determined that the examined wired training vineyards have the highest fertiliser cost per hectare was TRY 340.36 in 15-15-15 fertiliser, following by with TRY 185.9 sulphur, TRY 101.5 potassium sulphate, TRY 87.1 Diammonium Phosphate and TRY 87.1 33 percent ammonium nitrate. In goble training vineyards, it was determined that the producers use 470 kg animal manure, 226.3 kg 15-15-15 fertiliser, 69.7 kg powder sulphur and 63.9 kg 33 percent ammonium nitrate per hectare regarding quantity.

Table 8. Fertilisers types and quantities used by interviewed grape producers

Fertiliser	Goble Quantity (kg ha^{-1})	Goble Price (TRY kg^{-1})	Goble Cost (TL ha^{-1})
15-15-15	226.3	1.18	267.0
20-20-0	15.4	0.98	15.1
(33 %) Ammonium Nitrate	63.9	1.02	65.2
Ammonium Sulphate	18.0	0.71	12.8
(26%) Ammonium Nitrate	16.2	1.40	22.7
Animal Manure	470.0	0.08	37.6
Diammonium Phosphate	46.1	1.06	48.9
Eko-9	0.00	0.00	0.00
Soil Fertilizer	07.2	1.00	07.2
Sulphur (Powder)	69.7	1.86	129.6
Organic Fertilizer	12.1	1.48	17.9
Potassium Nitrate	1.2	1.30	1.6
Potassium Sulphate	14.6	3.68	53.7
Chicken Manure	24.9	0.15	3.7
Urea	63.1	1.38	87.1
Fertiliser	**Wired Quantity (kg ha^{-1})**	**Wired Price (TRY kg^{-1})**	**Wired Cost (TL ha^{-1})**
15-15-15	255.9	1.33	340.3
20-20-0	3.7	1.33	4.9
(33 %) Ammonium Nitrate	61.4	1.12	68.8
Ammonium Sulphate	37.2	1.12	41.7
(26%) Ammonium Nitrate	0.00	0.00	0.00
Animal Manure	22.0	0.08	1.8
Diammonium Phosphate	82.2	1.06	87.1
Eko-9	10.1	1.25	12.6
Soil Fertilizer	0.00	0.00	0.00
Sulphur (Powder)	89.8	2.07	185.9
Organic Fertilizer	37.4	1.19	44.5
Potassium Nitrate	1.8	1.25	2.3
Potassium Sulphate	26.3	3.86	101.5
Chicken Manure	18.3	0.15	2.7
Urea	37.8	1.48	55.9
Fertiliser	**Total Quantity (kg ha^{-1})**	**Total Quantity (kg ha^{-1})**	**Total Quantity (kg ha^{-1})**
15-15-15	244.9	244.9	244.9
20-20-0	8.0	8.0	8.0
(33 %) Ammonium Nitrate	62.3	62.3	62.3
Ammonium Sulphate	30.1	30.1	30.1
(26%) Ammonium Nitrate	6.0	6.0	6.0
Animal Manure	187.9	187.9	187.9
Diammonium Phosphate	68.8	68.8	68.8
Eko-9	6.3	6.3	6.3
Soil Fertilizer	2.7	2.7	2.7
Sulphur (Powder)	82.3	82.3	82.3
Organic Fertilizer	28.0	28.0	28.0
Potassium Nitrate	1.6	1.6	1.6
Potassium Sulphate	22.0	22.0	22.0
Chicken Manure	20.8	20.8	20.8
Urea	47.2	47.2	47.2

Source: own calculation

Regarding the monetary value of fertilisers, it was determined that the interviewed goble training vineyards have the highest fertiliser cost per hectare was TRY 267.0 in 15-15-15 fertiliser. It was calculated that sulphur cost was TRY 129.6, urea cost was TRY 87.1, 33 percent ammonium nitrate cost was TRY 65.2 and potassium sulphate cost was TRY 53.7 per hectare.

Table 9 shows the grape production technique in the vineyards according to the production system. In the interviewed wired training vineyards, the soil processing activities were done on average six times per year from February to May. Plough, disc harrow, cultivator and roller were used for soil cultivation. In the wired training vineyards, it was found that the fertilisation was done at 2.06 annual averages from January to June. It was determined that 103.6 kg of nitrogen, 89.9 kg of phosphorus, 42.1 kg of potassium and 89.8 kg of sulphur be used per hectare as plant nutrient during the production period. In the wired vineyards fertilisation was done by manually or fertiliser machine, cultivator and drip irrigation system and chemical spraying was done with the help of an atomiser averagely 15 times between March and September. It was determined that producers use an insecticide, fungicide and metallic copper against various diseases and pests. In the wired training vineyards producers used 3.29 kg of insecticide, 1.58 kg of fungicide and 5.17 kg of metallic copper averagely in the research area. The pruning was carried out on average once a year in January with the pruning shears. In the wired vineyards hoeing was done 1.41 times averagely between the months January and April with a hoe, rotavators or cultivator. It was determined that irrigation was done eight times a year between May and September by drip irrigation. In the research region, the grape harvest was made in September, and the transportation was carried out by the merchant. In the goble training vineyards, the soil processing activities were done on average four times per year from March to June. Plough, disc harrow, cultivator and roller were used for soil cultivation.

Table 9. Production technique in interviewed vineyards

Goble				
Operation	**Time**	**Number**	**Tool**	**Quantity**
Soil preparation	March-June	4	Plough, disc harrow, cultivator, roller	-
Fertilisation	January-June	1.26	Manually, fertilisation machine, cultivator, atomiser	N 106.6 - P 64.2 - K 44.5 - S 69.7 Kg ha^{-1}
Pesticide spraying	March- September	6	Atomizer, pulverisator / back pomp	7.27 İnsecticide - 3.32 Fungicide 30.69 metallic copper (Kg ha^{-1})
Pruning	February- March	1	pruning shears	-
Hoeing	March-June	1.47	manually, hoeing machine, cultivator	-
Irrigation	June- July	0.54	drip, flood and spraying irrigation	-
Harvest	September	1	merchant	-
Transport	September	1	Trailer	-
Wired				
Operation	**Time**	**Number**	**Tool**	**Quantity**
Soil preparation	February- May	6	Plough, disc harrow, cultivator, roller	-
Fertilisation	January-June	2.06	Manually, fertilisation machine, cultivator, drip irrigation	N 103.6 - P 89.9 - K 42.1 - S 89.8 Kg ha^{-1}
Pesticide spraying	March- September	15	Atomizer,	3.29 İnsecticide - 1.58 Fungicide - 5.17 metallic copper (Kg ha^{-1})
Pruning	January	1	pruning shears	-
Hoeing	January- April	1.41	manually, hoeing machine, cultivator	-
Irrigation	May- September	8	Drip and flood irrigation	-
Harvest	September	1	merchant	-
Transport	September	1	Trailer	-

Source: own calculation

In the goble training vineyards, it was found that the fertilisation was done at 1.26 annual averages from January to June. It was determined that 106.6 kg of nitrogen, 64.2 kg of phosphorus, 44.5 kg of potassium and 69.7 kg of sulphur were used per hectare as plant nutrient during the production period.

It was determined that fertilisation was done by manually or fertiliser machine and cultivator. It was determined that pesticide spraying was done with an atomiser average six times between March and September in the goble training vineyards. It was determined that producers use an insecticide, fungicide and metallic copper against various diseases and pests. In the goble training vineyards, producers used 7.27 kg of insecticide, 3.32 kg of fungicide and 30.69 kg of metallic copper averagely in the research area. The pruning was carried out on average once a year in February or March with the pruning shears. Hoeing was done 1.47 times between March and June averagely with a hoe, rotavators or cultivator. It was determined that irrigation was done 0.54 times a year between June to July with the drip irrigation system or traditional flood irrigation. In the research region, the grape harvest was made in September, and the transportation was carried out by the merchant (Table 9).

Table 10. Variable costs in grape production according to the production system in interviewed vineyards

Cost types	Goble		Wired		Total	
	Amount (TRY ha^{-1})	%	Amount (TRY ha^{-1})	%	Amount (TRY ha^{-1})	%
Labour cost	2,408.3	56.13	4,013.7	**61.98**	3,419.0	60.34
Fertilizer cost	774.6	18.05	958.9	14.81	890.6	15.72
Pesticide cost	391.4	9.12	342.1	5.28	360.3	6.36
Irrigation cost	46.9	1.09	294.6	4.55	202.8	3.58
Machinery cost	368.6	8.59	434.2	6.70	409.9	7.23
Other variable cost	300.5	7.00	432.4	6.68	383.5	6.77
Variable cost	4,290.3	100.0	6,475.9	100	5,666.2	100.0

Source: own calculation

Table 10 shows the distribution of variable cost according to the production system. In general, it was determined the interviewed vineyards have to TRY 5,666.2 total variable costs. 60.34% of the variable costs were composed of labour costs, 15.72% were fertiliser costs, 7.23% were from machinery cost, 6.77% were from other variable cost, 6.36% were pesticide costs and the remaining 3.58% were from irrigation costs in the grape production. According to the production system, it was determined that the cost of labour in wired training be higher in both proportional and value (Table 10).

Also, fertiliser, irrigation, shrinkage and other costs were higher in wired training than the goble training vineyard as the monetary value (Table 10).

Table 11. Profitability indicators in interviewed vineyards

Profitability indicators	Goble	Wired	Total
Yield (tonnes ha^{-1})	4.86	18.33	13.34
Grape selling price (TRY kg^{-1})	1.79	0.74	1.24
Gross production value (TRY ha^{-1})	8,705.4	13,565.9	16,544.8
Variable cost (TRY ha^{-1})	4,290.3	6,475.9	5,666.2
Gross profit (TRY ha^{-1})	4,415.1	7,090.0	10,878.6

Source: own calculation

Table 11 shows some profitability indicators according to the grape production system. In total vineyard had 13.34 tonnes of grape yield, they sold the grape to an average of TRY 1.24, and they had a gross production value of TRY 16,544.8 per hectare. After deducting the variable costs, the gross profit of the grape production was calculated as TRY 10,878.6. This rate was found to be TRY 7,090 per hectare for wired training production and TRY 4,415.1 for in goble training production (Table 11).

CONCLUSIONS

The purpose of this study was to reveal the economic analysis of the vineyards by comparing wired and goble training production system in Denizli Province. The data of the study was obtained from grape producers of two different production system in Denizli Province. It was determined that grape production mostly made in aqueous conditions and goble training production was done in non-irrigated vineyards. Because of this situation, according to the wired training vineyards, it was found that the yield was about 1.6 times higher than the goble training system. It was determined that the labour force was used intensively in both production systems. However, more labour was used in the wired training vineyards than in the goble training system. When an evaluation was

made regarding profitability indicators, It was determined that the gross production value be higher in the wired training vineyards. According to these results, it can be said that the wired training system was more advantageous regarding economic criteria.

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