INVESTIGATION OF THE COST AND PROFITABILITY OF APRICOT PRODUCTION IN ISPARTA

Mevlüt GÜL, Sultan POYRAZ

Isparta University of Applied Sciences, Faculty of Agriculture, Department of Agricultural Economics, 32260, Isparta, Türkiye, E-mails: mevlutgul@isparta.edu.tr, sultanpoyraz@isparta.edu.tr

Corresponding author: mevlutgul@isparta.edu.tr

Abstract

The aim of this study was to examine the cost and profitability of apricot farms in Isparta province. The main material of the research; The data obtained from 138 apricot farms in the villages where apricot cultivation is intense in Yalvaç and Senirkent districts of Isparta province, which has a planting area of 91% and a production share of 87%, were obtained by the survey method. Neyman Method was used in the determination of the sample volume. As a result of the calculations, the sample volume was determined as 138 enterprises. The data obtained from the enterprises belonged to the production season of 2021. Apricot production costs per decare were calculated as 6 013.62 TRY, gross production value was 25090.66 TRY, gross profit was to be 21933.14 TRY, absolute profit was 19077.04 TRY and relative profit was calculated as 4.17 on average of farms. Production cost of 1 kg of apricot was determined as 1.84 TRY. Since the profitability of apricot production is high as of the year examined, it can be stated that the producers will continue to produce in the coming years.

Key words: *apricot, production cost, profit, Isparta*

INTRODUCTION

Apricot is produced in 78 countries worldwide. In terms of apricot exports and production, Türkiye plays a significant role. In terms of production and export, it comes in first place worldwide [3][14].

Apricot is produced in 78 countries around the world. While the world apricot production amount was 2.78 million tonnes in 2004, it increased by 29% in 2021 to 3.58 million tonnes. In this period, the highest increase in production (about 10 times) was in Armenia. It was followed by Azerbaijan, which increased its production 4.3 times, Afghanistan, which increased 3.1 times, and Uzbekistan, which increased 2.5 times. The most important apricot producing countries are Türkiye, Uzbekistan, Iran, Algeria, Italy, Pakistan, Spain, Afghanistan and Japan. Türkiye ranks first with 800 thousand tonnes of apricot production. Uzbekistan ranked second with 425 thousand tonnes, Iran ranked third with 323 thousand tonnes and Algeria ranked fourth with 190 thousand tonnes of apricot production on FAOSTAT data [9]. Türkiye, which is the leader in apricot

planting area and production, remains below the world average in terms of yield. Türkiye, which is also the leader in dried apricot exports, has gained momentum in fresh apricot exports in recent years. Especially after 2011, it exceeded 50 thousand tonnes.

Horticultural crops have played a significantly vital part in supplementing the diet of people with their unique flavor and diverse biochemical with high antioxidant effect [6] [19].

In Isparta province, which was selected as the research region, the apricot planted area, which was 9,870 decares (1 decare equal 0.1 hectare) in 2004, increased 2.2 times in 2022 and reached 26,227 decares. The production amount was 12.3 thousand tonnes in 2004. In 2022, apricot production in Isparta province increased 2.4 times compared to 2004 and reached 29.1 thousand tonnes depend on TURKSTAT data [24]. This increase is mostly due to the expansion in apricot planted areas.

The reasons for the selection of apricot product and Isparta province as the subject of the study were: (i) Türkiye's apricot production ranks important in the world, (ii)

the significant development in Isparta province as an alternative to apple and cherry in recent years, (iii) the insufficiency of researches on economic evaluation in the province on the subject.

In Isparta province, which was selected as the research region, apricot production is intensive in Yalvaç and Senirkent districts. Based on 2004, there was an expansion of 4.34 times in the apricot planted area in Senirkent district in 2022. Yalvaç district experienced an increase of 2.82 times. In this period, the change in the amount of production was 2.36 times increase in Isparta province, 5.2 times increase in Senirkent district and 2.1 times increase in Yalvaç district. Changes in yield are especially affected by spring frosts.

In this study, apricot production costs and profitability in Isparta province were analysed and the problems of producers were examined.

MATERIALS AND METHODS

The main material of the research was the primary data obtained by the face-to-face survey method of the apricot producer from farms in the Senirkent and Yalvaç districts of Isparta. In order to determine apricot orchard establishment costs, data were collected from five sample farms in Senirkent and Yalvaç districts of Isparta province. The data obtained from apricot farms belonged to the production period of 2021. The number of farmers to be interviewed was calculated as 138 farmers with a margin of error of 5% and 99% confidence interval by using the Neyman Method, one of the stratified sampling methods.

The farms were divided into three strata according to apricot planted area. Farms with apricot planting area of 7.50 decares or less (21 farms) were defined as group I, farms between 7.51-20.00 decares (55 farms) were defined as group II, farms with apricot planting area of 20.01 and more decares (62 farms) were defined as group III.

The farms interviewed in the research region were active in other production branches besides apricot cultivation. For this reason,

single product budget analysis method was used in the calculation of farm costs. Apricot production costs of apricot farms were calculated under two headings: variable costs and fixed costs.

In the calculation of the family labour wage equivalent, the prevailing wages of female and male foreign labour in the region were taken into account. Revolving fund interest was calculated by taking half (9%) of the loan interest rate (18%) applied by the Turkish Ziraat Bank for crop production. General administrative expenses were calculated by taking 3% of the total variable costs incurred in apricot production.

In the economic evaluation of apricot farms, gross production value, gross profit, absolute (net) profit and relative profit were calculated.

In the Neyman method, the arithmetic mean applied in the calculations does not reflect the average of the research area, since more samples are taken from the stratum with high variance. For this reason, the coefficient calculation was made for each stratum by proportioning the number of frequencies per farm stratum to the total number of frequencies. The data obtained for each stratum were multiplied by the calculated coefficients and calculated as the general farm average value and regional average [12][13].

In fruit growing, there are facility period and production period. Facility costs refer to the sum of the expenses spent for the works carried out until the perennial plants begin to yield. Not all facility costs are incurred in the first year. Some of them are incurred in the first year, some for a few years and some every year until the yield is obtained. By dividing the sum of facility costs by the economic life of the garden, the depreciation share of facility costs was found. By adding this value to the costs incurred during the production period, the general sum of the production period costs is obtained. Normal interest of 7%, 3% administrative expenses and 5% bare land value were added to the total of the costs incurred during the establishment period each year. The establishment period was taken as 5 years [1][7]. According to the depreciation rates of 2021, the useful economic life of the apricot

tree was reported as 25 years by the Turkish Revenue Administration [11]. Considering this economic life, depreciation for the plant period was calculated.

RESULTS AND DISCUSSIONS

Value of production in farms
The gross production values were calculated by multiplying the amount of plant and animal production produced in the 138 farms interviewed by the prices of these products and adding the increase in productive fixed assets to the value obtained by multiplying the prices of these products. According to the farm average, the total production value (GPV) was calculated at 842,459.59 TRY. 85.27% of the total gross production value was obtained from apricot production, 7.62% from animal products and 7.11% from other plant products. Total gross production value was determined at 101,783.16 TRY in the first layer, 364,993.79 TRY on the second layer and 1,516,892.22 TRY for the third layer. According to the business groups, the share in the total gross production value of apricot was 79.17% in the first layer, 71.62% in the second layer and 88.32% in the third layer. The highest gross production value was detected in farms in the third layer (Table 1). The factors that influence this are the transitory varieties of the apricot sold and, in general, the availability to the foreign market through export.
Demirtaş [7] determined the value of gross production of enterprises producing apricot in the districts of Insel or Mut and Gülnar at prices of 3,003.98 TRY in 2021. Fidan [10] calculated the gross production value of enterprises producing apricot in the Iğdır or Central district and Tuzluca districts at an average of 2,904.67 TRY at 2021 prices. Sarıbaş [21] calculated the production value of enterprises producing apricots in Malatya or Akçadağ, Battalgazi, Darende, Hekimhan and Central districts as an average of 3,758.74 TRY at 2021 prices. In the study carried out in the province of Malatya in 2019, the average gross production values of enterprises producing organic apricot found 157,960.5 TRY [4].

The gross production value in the research area was found to be comparatively higher than that in other studies. This is due to the high prices of apricots in the last two years. The fact that late spring frosts are not too much has influenced the yield in a positive direction. Manufacturers sold 1 kg of apricot in the price range of 6-15 TRY, depending on the case of sale to the domestic and foreign market. Late varieties have influenced the higher formation of the price in a positive direction.

Table 1. Value of production in farms

Production Branches	Farming groups			FA	RA
	I	II	III		
	Quantity (TRY)				
Apricot's GPV	80,581.78	261,399.61	1,339,742.08	718,356.56	321,395.11
Other plant's GPV	13,182.33	56,388.00	78,915.47	59,934.26	43,553.85
Animal's GPV	8,019.05	47,206.18	98,234.68	64,168.77	39,101.08
Total's GPV	101,783.16	364,993.79	1,516,892.2	842,459.59	404,050.04
	Ratio (%)				
Apricot's GPV	79.17	71.62	88.32	85.27	79.54
Other plant's GPV	12.95	15.45	5.20	7.11	10.78
Animal's GPV	7.88	12.93	6.48	7.62	9.68
Total's GPV	100.00	100.00	100.00	100.00	100.00

FA: Farm average; RA: region average
1 TRY = 8.89 ABD$ (2021 average)
Source: Own calculation.

Farmers' Costs of Apricot Production
Cost calculations of farms engaged in agricultural production are very important. In the agricultural production process, the monetary value of the goods and services that need to be consumed in order to produce a product is referred to as cost. In general, the comparison of the gross production value obtained in a production period with the costs reveals whether the activity is economic or not. In general, the costs incurred in production in the short term are classified as variable and fixed costs. Fixed costs are costs that do not depend on the level of production and are incurred whether production is carried out or not. Depreciation, interest, land rent, building repair and maintenance costs, tax and insurance fees, permanent labour wages are included in the fixed costs.
Variable costs are characterized as costs that increase or decrease depending on the level of production. Examples of variable costs are chemical fertilizer, water fee, feed, temporary worker wages, pesticide, spraying fee, oil-

repair and maintenance costs, fuel oil, tool and machine rent, marketing costs, revolving fund costs [2] [16] [17].

The most common expenses incurred for apricot production are spraying, irrigation, harvesting and pruning. While early variety apricot cultivation positively affects the income of the producer, the low yield due to adverse weather conditions leads the producers to reduce the cost elements to be incurred for the next production year [8].

The variable cost elements of apricot farms are fertilizer, medicine, temporary labour, water cost, machine rent, marketing and revolving capital interest. According to this, the average variable costs of apricot farms totalled 90,401.36 TRY. According to the regional average, the total of variable costs was determined as 48,493.50 TRY. According to the planted area width, the total variable costs of the farms in the first stratum were 15,679.51 TRY, 47,697.09 TRY in the second stratum and 153,593.20 TRY in the third stratum (Table 2).

The share of variable costs in total production costs was identified at 52.51%. The share of variable costs in the region average was 51.00%. The share of the variable costs of the farms in total costs according to the width of the plant area was determined as 46.14% in the first layer, 50.65% in the second layer and 53.30% on the third layer. When the average values of proportionally variable costs were analyzed, the highest share belonged to marketing with 11.40%. The marketing item is followed by machine rent with 9.60%, fertilizer with 8.60%, temporary labour with 6.80%, pesticide with 5.89% and water fee with 5.87% (Table 2).

The fixed cost items of the farms examined were general administrative expenses, land rent, permanent family labour force, facility depreciation and facility period interest. The average value of the fixed costs incurred by the farms for apricot production was 81,771.31 TRY. The average value of the region was found as 46,591.93 TRY. The fixed costs of the enterprises were calculated as 18,306.43 TRY in the first stratum, 46,477.75 TRY in the second stratum and

134,576.28 TRY in the third stratum (Table 2).

The share of fixed costs in total production costs was 47.49% while the regional average was 49.00%. The ratio of fixed costs was found to be 53.8 % in the first layer, 49.35% in the second layer and 46.70% in the third layer. In proportional terms, the most important expense item in fixed costs was found to be land rent with 17.93%. Land rent was followed by plant depreciation with 10.84%, plant period interest with 10.52%, permanent family labour with 6.63% and general administrative expenses with 1.58% (Table 2). Demirtaş and Gül [8] determined that apricot farms' fixed cost share was 39.70% and their variable cost share was 60.30% in the Mersin province. Uçar and Engindeniz [26] found that the share of apricot variable costs in total costs was 63.52% in their study in Malatya province.

On average, the surveyed farms calculated that the cost of apricot production was 172,172.67 TRY, while on the regional average it was 95,085.43 TRY.

Table 2. Costs of apricot production

Cost elements	Farming groups			FA	RA
	I	II	III		
	Production costs (TRY per farms)				
Fertiliser	1 972.14	7 044.00	26 055.00	14 813.37	7 428.54
Agrochemical	2 311.19	5 905.45	16 563.23	10 146.78	5 852.73
Temporary workforce	2 695.79	5 911.05	19 898.95	11 706.19	6 378.53
Water cost	2 328.90	5 733.09	16 611.61	10 102.51	5 773.79
Machine rental	3 362.86	10 376.82	26 461.29	16 535.83	9 729.30
Marketing	1 713.99	8 788.39	35 321.11	19 632.35	9 326.56
Revolving fund interest	1 294.64	3 938.29	12 682.01	7 464.33	4 004.05
Variable costs	15 679.51	47 697.09	153 593.20	90 401.36	48 493.50
General administrative expenses	470.39	1 430.91	4 607.80	2 712.04	1 454.80
Land rent	6 117.86	17 105.91	51 450.40	30 863.95	17 148.39
Permanent/family workforce	3 435.31	7 463.95	17 641.05	11 423.22	7 200.49
Facility depreciation	4 324.14	10 449.97	30 798.39	18 659.82	10 612.47
Facility term interest	3 958.74	10 027.01	30 078.64	18 112.28	10 175.78
Fixed costs	18 306.43	46 477.75	134 576.28	81 771.31	46 591.93
Production costs	33 985.94	94 174.84	288 169.48	172 172.67	95 085.43
	Ratio (%)				
Fertiliser	5.80	7.48	9.04	8.60	7.81
Agrochemical	6.80	6.27	5.75	5.89	6.16
Temporary workforce	7.93	6.28	6.91	6.80	6.71
Water cost	6.85	6.09	5.76	5.87	6.07
Machine rental	9.89	11.02	9.18	9.60	10.23
Marketing	5.04	9.33	12.26	11.40	9.81
Revolving fund interest	3.81	4.18	4.40	4.34	4.21
Variable costs	46.14	50.65	53.30	52.51	51.00
General administrative expenses	1.38	1.52	1.60	1.58	1.53
Land rent	18.00	18.16	17.85	17.93	18.03
Permanent family workforce	10.11	7.93	6.12	6.63	7.57
Facility depreciation	12.72	11.10	10.69	10.84	11.16
Facility term interest	11.65	10.65	10.44	10.52	10.70
Fixed costs	53.86	49.35	46.70	47.49	49.00
Production costs	100.00	100.00	100.00	100.00	100.00

Source: Own calculation.

The total production costs in the apricot production activity were found to be

33,985.94 TRY in the first layer, 94,174.84 TRY in the second layer and 288,169.48 TRY in the third layer (Table 2).

The total variable costs of the surveyed apricot farms were found to be 3,157.53 TRY per decares. According to the regional average, the total variable costs were found at 3,054.77 TRY per decares. The variable costs of the farms in the first layer were calculated at 2,676.99 TRY, 3,046.85 TRY in the second layer and 3,209.56 TRY for the third layer per decares (Table 3).

The fixed cost of farms was 2,856.10 TRY per decares. The fixed cost value in the regional average was 2,934.98 TRY per decares. The fixed cost value for the first layer was determined at 3,125.49 TRY, 2 968.96 TRY for the second layer and 2 812.18 TRY in the third layer per decares (Table 3).

The total average production costs of the farms surveyed were estimated at 6,013.62 TRY, while the regional average was 5,989.76 TRY per decares. The total production costs for the first layer were 5,802.48 TRY, 6,015.81 TRY for the second layer and 6,021.74 TRY per decares in the third layer (Table 3).

Demirtaş [7] calculated the total average variable cost of apricot farms in Mersin province to 34,147,985 TRY. The proportional distribution of the elements of the cost was also calculated in the form of temporary labour at 49.79%, fertiliser at 13.05%, tool-machine at 8.19%, agrochemical at 8.10%, marketing at 7.05%, water fee at 6.58%, capital interest at 6.49%, and revenue at 0.75%. Fidan [10] calculated the total variable cost of farms producing apricot in Iğdır province at 391.03 TRY. He found that labour costs accounted for 43.78% of the variable cost, while fertiliser cost was 20.33%, turnover capital rate was 8.25%, agrochemical was 11.93%, harvest and marketing was 6.95%, tool-machine was 4.41%, and water fee was 4.35%. The average fixed cost of was found at 175.38 TRY. Sarıbaş [21] found the variable cost of farms producing apricots in Malatya province to be 665.88 TRY. Uçar [25], calculated the average cost of apricot production for farms producing apricots in the province of Malatya

as 975.29 TRY, labour costs 312.84 TRY and material costs 364.22 TRY. In the study carried out in the province of Malatya, Çatı [4] calculated the production costs per decares of farms producing organic apricots as 1 279.4 TRY per average land asset and 1 780.8 TRY per average apricot area, when all farms were taken into account.

Table 3. The cost of production of apricot on the unit area

Cost elements	Farming groups			FA	RA
	I	II	III		
	Production costs (TRY per farms)				
Fertiliser	336.71	449.97	544.46	517.40	467.95
Agrochemical	394.59	377.24	346.11	354.41	368.68
Temporary workforce	460.26	377.59	415.82	408.87	401.81
Water cost	397.62	366.23	347.13	352.86	363.71
Machine rental	574.15	662.86	552.95	577.56	612.88
Marketing	292.63	561.40	738.09	685.72	587.51
Revolving fund interest	221.04	251.57	265.01	260.71	252.23
Variable costs	*2,676.99*	*3,046.85*	*3,209.56*	*3,157.53*	*3,054.77*
General administrative expenses	80.31	91.41	96.29	94.73	91.64
Land rent	1,044.51	1,092.71	1,075.13	1,078.01	1,080.24
Permanent/family workforce	586.52	476.79	368.64	398.99	453.58
Facility depreciation	738.27	667.54	643.58	651.75	668.52
Facility term interest	675.88	640.52	628.54	632.62	641.01
Fixed costs	*3,125.49*	*2,968.96*	*2,812.18*	*2,856.10*	*2,934.98*
Production costs	*5,802.48*	*6,015.81*	*6,021.74*	*6,013.62*	*5,989.76*

Source: Own calculation.

Profitability indicators of farms

Gross production value refers to the value increase resulting from the crop and animal production obtained as a result of a farm's agricultural production activity for one year. Gross production value can be calculated separately for different production branches in the farm or for the whole farm.

The gross value production value obtained from apricot production per decare of the farms examined was calculated as 25,090.66 TRY. The gross production value per decare in the average of the region was found to be 20,245.77 TRY. Gross production value per decare was determined as 13,757.86 TRY in the first layer, 16,698.00 TRY in the second layer and 27,995.96 TRY in the third layer (Table 4).

Gross profit was calculated by subtracting the changing costs from the gross production value of apricot production of the enterprises. Accordingly, the gross profit per decare of the farms analysed was calculated as 21,933.14 TRY and the gross profit per decare in the average of the region was calculated as 17,191.00 TRY. Gross profit per decare was calculated as 11,080.87 TRY in the first stratum, 13,651.15 TRY in the second stratum

and 24,786.39 TRY in the third stratum (Table 4).

Absolute (net) profit was calculated by subtracting the production costs per decare from the gross production value per decare. The absolute profit per decare of the enterprises was determined as 19,077.04 TRY. According to the regional average, absolute profit per decare was calculated as 14,256.02 TRY. Absolute profit per decare was calculated as 7,955.39 TRY in the first stratum, 10,682.19 TRY in the second stratum and 21,974.22 TRY in the third stratum (Table 4).

Relative profit was calculated by dividing gross production value by production costs. The relative profit per decare of the farms was found to be 4.17. According to the average of the region, the relative profit was calculated as 3.38 (Table 4).

The relative profit was calculated as 2.37 in the first stratum, 2.78 in the second stratum and 4.65 in the third stratum. The production value obtained for apricot production in return for one unit of cost is expressed by the relative profit value. According to this, it was determined that for every 1 TRY cost incurred in apricot production activity, a production value of 4.17 TRY was obtained, thus 3.17 TRY profit was obtained for every 1 TRY in the average of the farms interviewed. It was determined that 1.37 TRY profit was obtained for every 1 TRY in the farms in the first stratum, 1.78 TRY profit was obtained for every 1 TRY in the farms in the second stratum and 3.65 TRY profit was obtained for every 1 TRY in the farms in the third stratum. The highest profit was found in the third stratum. It was calculated that the profit rate increased with the width of the planted area (Table 4).

Demirtaş [7] calculated the gross production value per decare in apricot production of farms in Mersin province as 3,003.98 TRY, gross profit as 1,607.94 TRY, absolute profit as 840.36 TRY and relative profit as 139% in 2021 prices. Fidan [10] calculated the gross production value of the farms in Igdir province as 2,904.67 TRY, gross profit as 1,474.46 TRY, absolute profit as 833.05 TRY, and relative profit as 1.40% in 2021 prices.

Sarıbaş [21] calculated the gross production value of apricot farms in Malatya province as 3,758.74 TRY, absolute profit as 570.81 TRY, and relative profit as 117.91% in 2021 prices. Uçar [25] determined the gross production value per decare of apricot farms in Malatya province as 1,607.43 TRY and the relative profit as 164.82%. Çatı [4], in his study conducted in Malatya province, calculated the gross production value of organic apricot farms as 157,960.5 TRY, their absolute profit per decare as 1,448.6 TRY according to average land assets and 2,016.2 TRY according to average apricot areas.

Demirtaş [7] determined the relative profit in the Mersin to be 1.39. Moreover, Gül and Özen [15] computed the relative profit as 1.40 for farmers in the Mersin who used loans and 1.41 for those who did not.

Obtained results are broadly consistent with earlier researches. Although the differences are thought to be mainly caused by the variation of the investigated genotypes, differences in cultivars, ecological characteristics, altitude, maturity stage, harvest time and type, process, storage etc. cause serious variations on crop quality [5][18]thus effect the last economic gain of crops or products.

Table 4. Profitability indicators in apricot production

Indicators	Farming groups			FA	RA
	I	II	III		
	Quantity (TRY per decares)				
GPV	13,757.86	16,698.00	27,995.96	25,090.66	20,245.77
Gross profit	11,080.87	13,651.15	24,786.39	21,933.14	17,191.00
Absolute profit	7,955.39	10,682.19	21,974.22	19,077.04	14,256.02
Relative profit	2.37	2.78	4.65	4.17	3.38

Source: Own calculation.

Apricot price per unit, production cost and profit margin of the investigated farms were calculated with the following formulae.

1 kg apricot production cost = Total apricot production costs/Amount of apricot produced (kg)

1 kg apricot price = Total gross production value of apricot / Amount of apricot produced (kg)

1 kg apricot profit margin = 1 kg apricot price - 1 kg apricot cost

By dividing the gross production value by the total apricot production amount, the average

sales price of one kg apricot of the farms was found as 7.68 TRY. According to the average of the region, apricot sales price per kg was calculated as 6.93 TRY, while the sales price per kg of the farms according to the planted area width was 5.87 TRY in the first stratum, 6.19 TRY in the second stratum and 8.07 TRY in the third stratum. Apricot prices increased due to the increase in the width of the planted area. At this point, economies of scale and the fact that large farms include more new and late apricot varieties helped them to achieve this high price advantage.

According to the data of the Turkish Statistical Institute in 2021, the average selling price of one kg of apricot in Türkiye was 6.66 TRY. In Isparta province, which covers the research region, 5.8 TRY was reported [24]. The sales price determined in the research region was found to be high according to TURKSTAT data. This situation can be attributed to the cultivars grown (early, late) and enterprise facilities.

One kg apricot production cost was calculated by dividing the total apricot production costs of 138 apricot farms by the amount of apricot produced. Accordingly, the average cost of one kg of apricot was found to be 1.84 TRY. According to the regional average, one kg apricot cost was calculated as 2.05 TRY. In the enterprise groups, one kg apricot cost was found as 2.48 TRY in the first layer, 2.23 TRY in the second layer and 1.74 TRY in the third layer.

The average profit margin of the farms was determined as 5.84 TRY by subtracting the kilogram cost from the kilogram sales price of apricot. According to the regional average, this ratio was determined as 4.88 TRY. In the farms in the first stratum, 3.40 TRY, in the second stratum 3.96 TRY and in the third stratum 6.33 TRY were calculated. The highest profit margin was realized in the farms in the third stratum. The reason for this may be that the new varieties of apricots produced are more in this group and higher yields are obtained and sold at higher prices than other apricot varieties through exports.

Impact of agricultural support on profitability indicators

The average gross production value of the farms in the research region was calculated as 25,133.34 TRY per decare with the effect of agricultural subsidies received from the public. In the average of the region, the gross production value per decare was 20,285.96 TRY. According to the planted area width, the gross production value was calculated as 13,780.05 TRY in the first stratum, 16,740.47 TRY in the second stratum and 28,039.55 TRY in the third stratum. The average gross profit of the farms was 21,975.81 TRY per decare, net profit was 19,119.72 TRY and relative profit was 4.18 (Table 5).

The agricultural subsidies received by the farms in the research region increased the gross production value by 0.17%, gross profit by 0.19%, net profit by 0.22% and relative profit by 0.17%.

Şirikçi and Gül [23] found that agricultural subsidies utilized by farmers positively changed the profitability indicators in quince production activity. They found that the support received by farmers increased their relative profitability by 0.04.

Table 5. Profitability indicators with the impact of agricultural support

Indicators	Farming groups			FA	RA
	I	II	III		
	Quantity (TRY per decares)				
GPV	13,780.05	16,740.47	28,039.55	25,133.34	20,285.96
Gross profit	11,103.06	13,693.62	24,829.98	21,975.81	17,231.19
Absolute profit	7,977.57	10,724.66	22,017.80	19,119.72	14,296.20
Relative profit	2.37	2.78	4.66	4.18	3.39

Source: Own calculation.

Problems in Cultivation

The biggest problems of the examined farms related to apricot production, facility and cultivation were high input prices 28.99%, diseases and pests 22.46%, frost damages 10.14%, fragmentation of lands 9.42%, irrigation shortage 7.97%, high water fee 6.52%, high certified sapling prices 5.07%, electricity supply 4.35%, labour supply difficulty 3.62%, and lack of facilities 1.45% (Table 6).

The operators stated that they could not fertilize and spray at the desired level in apricot production due to the high prices of production inputs. Since the tree cannot get the necessary nutrients from the soil, there may be a decrease in product yield and

quality. One of the most important problems of the producers in the studied region is diseases and pests. Cultural and chemical control is carried out for diseases and pests. The presence of pigs in the region also causes economic damage to apricot trees and fruits. As in all regions where apricot production takes place, frost damage is another important problem. Frost events can affect the producers partially or completely negatively. Due to late spring frosts, some years the producers get very low yields and some years they do not get any yields. While frost damage is experienced in some of the apricot gardens in the same region, it is not experienced in some gardens. The reason for this is the location of the land where the garden is established. In other words, it is the wrong installation. Therefore, the location of the garden should be determined consciously before the garden is established. Another problem is the fragmentation of the land structure, which restricts the agricultural mechanization activities of the producers and causes loss of time.

Producers in the region irrigate their apricot orchards with water from Lake Eğirdir, the fourth largest lake in Türkiye. Drinking water of Isparta province and irrigation water used in agricultural production activities in the region are supplied from Lake Eğirdir. Due to global warming, unconscious water use and other factors, the water of Lake Eğirdir is shrinking. This situation has further increased the level of sensitivity of the people of the region and in line with all these reasons, farms have started to use drip irrigation system long ago (for about 13 years).

High water fees, lack of electricity in some lands where apricot orchards are located, difficulties in obtaining labour and the lack of facilities where apricot can be processed are other important cultivation problems stated by the producers.

Problems faced in marketing

When the problems encountered by the farms in the marketing process were analyzed, the most important marketing problem was found to be the lack of an official market with a rate of 29.71%. Price determination by brokers was mentioned by 21.01% of the farms, lack of supervision in marketing by 18.84%, storage problem by 8.70%, buyer's fraud by 7.25%, lack of a co-operative by 5.80%, broker's not making payment properly by 4.35%, lack of a processing industry by 2.17% and packaging problem by 1.45%. Due to the lack of a market in the region, producers stated that they had to sell their products to traders and brokers. The fact that the brokers are late or do not receive the return of the product, the problems experienced in the supply of crates, the lack of a storage system, and the marketing mechanism being far from a certain control negatively affect the producers (Table 7).

Özen and Gül [20], in their study conducted in Mersin province, identified inadequate apricot fruit set, lack of marketing opportunities and fluctuations in apricot prices as the main problems.

Şirikçi and Gül [22] found a positive relationship between relative profitability and marketing structure variable in quince farming.

Table 6. Problems encountered in apricot cultivation

Problems	Farming groups			FA
	I	II	III	
	Ratio (%)			
High input prices	28.57	32.73	25.81	28.99
Diseases and pests	28.57	23.64	19.35	22.46
Frost damage	9.52	12.73	8.06	10.14
The fragmentation of the land	4.76	3.64	16.13	9.42
Irrigation shortage	4.76	7.27	9.68	7.97
High cost of water	4.76	10.91	3.23	6.52
High prices of certified saplings	4.76	1.82	8.06	5.07
Electricity supply	4.76	1.82	6.45	4.35
Difficulty in labour supply	9.52	3.64	1.61	3.62
Lack of facilities	0.00	1.82	1.61	1.45
Total	100.00	100.00	100.00	100.00

Source: Own calculation.

Table 7. Problems in the apricot marketing process

Problems	Farming groups			FA
	I	II	III	
	Ratio (%)			
Lack of fresh fruit and vegetable market	28.57	21.82	37.10	29.71
Brokers' pricing	19.05	29.09	14.52	21.01
Marketing unsupervised	14.29	20.00	19.35	18.84
Storage shortage	4.76	9.09	9.68	8.70
Buyer's fraud	9.52	5.45	6.45	7.25
Lack of cooperative	9.52	5.45	4.84	5.80
Broker not paying properly	4.76	5.45	3.23	4.35
Lack of processing industry	4.76	1.82	1.61	2.17
Packaging problem	4.76	1.82	1.61	1.45
No marketing issues	0.00	0.00	1.61	0.72
Total	100.00	100.00	100.00	100.00

Source: Own calculation.

At this point, improvements in the marketing structure factor will positively affect the

relative profitability in quince cultivation. It can be stated that the same situation is valid for apricot production.

Problems faced in finance

To the question asked to determine whether the enterprises had problems with loan collateral, 97.83% said no and 2.17% said yes. Some of the enterprises stated that they could not use loans due to high loan interest rates.

CONCLUSIONS

Small-scale farms predominate in the region. The main source of income in the interviewed farms was the income from apricot production. The average production cost per decare in apricot production of the farms was 6,013.62 TRY.

Gross production value per decare in apricot production was 25,090.66 TRY; gross profits were calculated as 21,933.14 TRY, net profits as 19,077.04 TRY, and relative profits as 4.17. In the 2021 production season considered, apricot farms in the region made high profits from apricot production.

Based on the findings of this study, (i) farmers should be encouraged to benefit from economies of scale, (ii) the Government should provide necessary technological improvements to farmers regarding irrigation and provide more training opportunities to farmers regarding input use.

As a result, especially the good price realization in 2020-2021 increased the profitability of apricot farms.

This factor is also decisive and important for the sustainability of apricot production in the region.

ACKNOWLEDGEMENTS

REFERENCES

[1]Açıl, A.F., 1977, Calculation of agricultural production costs and developments in agricultural product cost in our country (in Turkish). Ankara University Faculty of Agriculture Publications, p. 76, Ankara.
[2]Açıl, A.F, Demirci, R, 1984, Agricultural economy lecture notes (in Turkish), T.C. Ankara University Agriculture Faculty Publications, Ankara.
[3]Akpınar, G., Gül, M., Dağıstan, E., 2006, Development and Structure of Fruit Trade in Turkey during the EU Accession Process (in Turkish). 7th Turkish Agricultural Economics Congress, pp. 836-848, Antalya.
[4]Çatı, E., 2019, Socio-economic characteristics of organic apricots production farms in Malatya (in Turkish). MSc. Thesis, Çukurova University, 117p., Adana.
[5]Çolak, A. M., Alan, F., Mertoğlu, K., Bulduk, I., 2022, Morphological, biochemical, and bioactive characterization of naturally grown European cranberry bush genotypes. Turkish Journal of Agriculture and Forestry, 46(2): 204-213.
[6]Çolak, A. M., Mertoğlu, K., Alan, F., Esatbeyoglu, T., Bulduk, İ., Akbel, E., Kahramanoğlu, I., 2022, screening of naturally grown European cranberrybush (*Viburnum opulus* L.) genotypes based on physico-chemical characteristics. Foods, 11(11): 1614.
[7]Demirtaş, B., 2000, Apricot production economics in İçel province (in Turkish). MSc. Thesis, Çukurova University, 107p., Adana.
[8]Demirtaş, B., Gül, A., 2000, A research on cost of apricot production in İçel province (in Turkish). Çukurova University, Journal of Agriculture Faculty, 15 (2): 47-54.
[9]FAOSTAT, 2022, Food and Agriculture Organization of the United Nations Statistical Databases. https://www.fao.org/faostat/en/#data/QCL, Accessed on 01.04.2022.
[10]Fidan, İ., 2009, Economic analyses of apricot production in Iğdir province (in Turkish). MSc. Thesis, Atatürk University, 74p., Erzurum.
[11]GİB, 2022, Amortization ratios (in Turkish). Gelir İdaresi Başkanlığı, Ankara.
[12]Gül, M., 1998, Production cost and producer problems of maize in irrigated areas of Yüreğir province (in Turkish). MSc. Thesis, Çukurova University, 118p., Adana.
[13]Gül, M., 2005, Economic analysis of apple farming in the trans-Taurus mountains region (in Turkish). PhD. Thesis, Çukurova University, 405p., Adana.
[14]Gül, M., Akpinar, M.G., 2006, An assessment of developments in fruit production in the World and Türkiye (in Turkish). Mediterranean Agricultural Sciences, 19(1): 15-27.
[15]Gül, M., Özen, M., 2019, The effect of agricultural credit usage on the socio-economic indicators of apricot farmers: A case of Mut district of Mersin in Türkiye. International Journal of Agriculture Forestry and Life Sciences, 3(2): 259-263.
[16]İnan, İ. H., 1998, Agricultural Economics and Management (in Turkish). Extended 4th. Ed., Tekirdağ.
[17]Kiral, T., Kasnakoglu, H., Tatlidil, F.F., Fidan, H., Gundogmus, E., 1999, Cost Calculation Methodology and Database Guide for Agricultural Products (in

Turkish). Agricultural Economics and Research Institute, TEPGE Report No: 1999-13, p. 143.

[18]Mertoğlu, K., 2022, Investigation of genetic parameters and phytochemical characteristics in plum under altitude change. Genetika, 54(1): 73-89.

[19]Mertoğlu, K., Akkurt, E., Evrenosoğlu, Y., Çolak, A. M., Esatbeyoglu, T., 2022, Horticultural Characteristics of Summer Apple Cultivars from Turkey. Plants, 11(6): 771.

[20]Özen, M., Gül, M., 2020, Marketing structure of apricot production and analysis of its problems: A case of Mut district in Mersin province. International Journal of Agriculture Forestry and Life Sciences, 4(1): 79-86.

[21]Sarıbaş, E. B., 2012, Economic analysis of Turkish apricot industry: A case study on Malatya province (in Turkish). MSc. Thesis, İstanbul University, 103p., İstanbul.

[22]Şirikçi B. S., Gül, M., 2019, Economic structure of quince farms in Turkey. Erwerbs-Obstbau, 61, 237-244.

[23]Şirikçi, B.S., Gül, M., 2021, Determination of effective factors and profitability on quince farmers in Turkey. Custos e Agronegocio on Line, 17 (2): 310-325.

[24]TURKSTAT, 2022, Turkish Statistical Institute, Agriculture database. https://biruni.tuik.gov.tr/medas/?kn=92&locale=tr, Accessed on 01.04.2022.

[25]Uçar, K., 2017, A research on analysis of investment decisions of apricot growers and risk evaluation in Malatya province (in Turkish). PhD. Thesis, Ege University, 169p., İzmir.

[26]Uçar, K., Engindeniz, S., 2021, A profitability analysis of investment of apricot growing in Turkey. Erwerbs-Obstbau 63, 75–80.