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ANALYSIS OF PRODUCTION COST AND PROFITABILITY OF ANISE PRODUCTION IN BURDUR, TURKEY

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Abstract

This study aimed to determine the socio-economic structure of farms producing anise and analyse the cost and profitability of anise production. The marketing structure has also changed with the changing trade and agricultural policies. As a result of these changes, price instability has been experienced in the anise market. Anise is an essential source of income in the research region. The research area is Burdur province because Burdur province has an important position in Turkey's anise production. The data were obtained by survey method from 159 anise farms. The production cost in anise production was determined as 739.33 TRY per unit area (Gross Production Value (GPV) 1,224.27 TRY, gross profit 635.38 TRY, and relative profit were 1.66. The Total Cost/GPV ratio was calculated as 0.60. In recent years, significant reductions in anise production in the region and increased cultivation areas in other provinces; fluctuations and volatility in anise producer prices substantially impacted these decreases. It is essential to provide anise-specific support and carry out extension activities about anise to producers through relevant institutions. To prevent price instability, institutions such as TEKEL and the TMO, which had a decisive influence on the anise market in previous years, were significant. It seems very difficult for such institutions to operate again. It is recommended that anise producers establish organisations to act together to eliminate the problems of anise producers and eliminate price instabilities specific to anise.

Key words**:** *anise, cost, profit, Burdur*

INTRODUCTION

Anise (*Pimpinella anisum* L.), which finds its place among medicinal and aromatic plants, is a species from the Apiaceae (Parsley family) family and is an essential plant with different usage areas. It is widely used in pharmaceuticals, cosmetics, and alcoholic and non-alcoholic beverage production [3] [13]. The seeds of the anise plant, widespread in Turkey and especially in the Lakes Region, are used as a tonic, antispasmodic, expectorant, antiseptic, antifungal, sedative, antidepressant and galactagogue [10]. Anise, which is used in the production of raki in Turkey, is also one of the medicinal and aromatic plants used in food, pharmacy and perfumery [5]. Anise fruits, which are cult in many countries, are among the essential export products among medicinal plants, so it is a plant with high economic value for Turkey [13]. Especially with the privatisation works that started in Turkey in the 1990s and the reorganisation of the policies in the agricultural sector in the 2000s, the production and marketing structure of anise has changed. With the withdrawal of the Turkish Grain Board (TMO) and TEKEL from the market, anise growers were adversely affected.

In addition, it can be said that the import of anise, which has become entirely free with the market liberalisation of alcohol and alcoholic beverages (taking into account that agriculture is supported in different systems in important producing countries and sometimes given with government subsidies), causes a significant contraction in Turkey's anise agriculture. Therefore, knowing the marketing structure, problems and costs of the producers in anise production, which takes place in the free market order, will benefit policy practitioners, intermediaries and producers.

In the first place in the anise cultivation area in Turkey in 2020, Denizli, Ankara and Burdur were determined as the research

region, respectively. These provinces are followed by Konya, Afyonkarahisar, Uşak and Antalya. Denizli province constitutes 19.19% of Turkey's anise cultivation area, Ankara province 17.47%, and Burdur province 16.33%. When the development of anise production in Turkey over the years is examined, Burdur province, which ranks third in Turkey's anise cultivation area, ranks first in Turkey's anise production amount. Anise production amount, which was 11,000 tons in 2004 in Turkey, decreased by only 3% to 10,716 tons in 2020, and there was no significant decrease in the amount of production. Konya and Ankara provinces, which started anise production activities in 2011, showed a substantial increase in anise production amounts in 2020. In Burdur, the production amount, 4,959 tons in 2004, decreased by 62% in 2020 to 1,891 tons (Table 1).

Table 1. Development of anise production in Turkey (tons)

Years	Burdur	Denizli	Konya	Ankara	Afyonkarahisar	Antalya	Muğla	Balıkesir	Bursa	Turkey
2004	4,959	3,369	-	-	502	1,570	16	273	276	11,000
2005	4,403	2,663	-	-	235	1,473	150	250	287	9,500
2006	3,118	2,810	-	-	275	1,566	150	260	259	8,479
2007	4,503	1,692	-	-	255	606	455	200	269	8,006
2008	4,682	1,928	-	-	248	606	600	231	275	8,594
2009	5,478	1,979	-	-	217	620	600	235	317	9,472
2010	8,449	1,985	-	-	290	620	2,000	235	393	13,992
2011	7,312	3,441	170	12	731	820	1,500	460	412	14,879
2012	4,268	3,171	188		475	995	1,201	260	444	11,023
2013	4,246	2,055	221	15	620	1,130	800	230	483	10,046
2014	4,021	1,998	183	3	554	930	900	184	440	9,309
2015	3,777	2,004	224	2	574	940	900	136	423	9,050
2016	3,927	2,387	204	2	540	883	950	85	429	9,491
2017	3,371	1,722	319	79	545	871	960	42	413	8,418
2018	3,432	1,464	525	232	937	697	1,000	35	188	8,664
2019	3,483	2,167	5,339	1,761	1,664	904	880	35	167	17,589
2020	1,891	1,849	1,651	1,349	1,321	974	440	27	13	10,716
Index*	38	55	971	11,242	263	62	2,750	10	5	97

*2020 (2004=100; 2011=100 for Konya and Ankara)
Source: [14].

When the shares of the provinces where anise production is realised in Turkey in 2020 within the total amount of anise production are examined, while the province of Burdur ranks first, making up 17.65% of Turkey's total, Denizli province, which makes up 17.25% of Turkey's total, ranks second. These provinces are followed by Konya, which accounts for 15.41% of Turkey's total (Fig. 1).

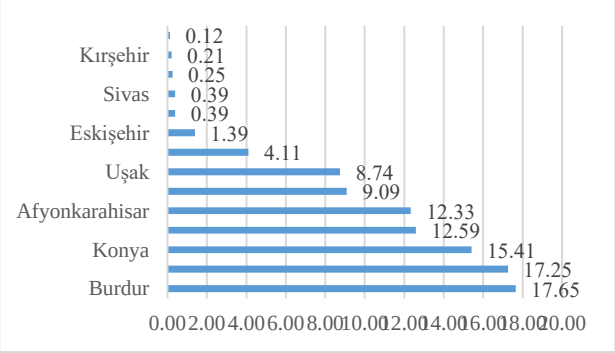


Fig.1. Share of anise production in Turkey in 2020 (%)
Source: Own design and calculation based on [14].

When the proportional shares of Burdur province in Turkey anise cultivation area and production amount are examined as of 2020, its share in cultivation area and production amount show parallelism. While Burdur province met more than 60% of Turkey's anise production in 2010, it decreased below 20% in 2019 and 2020.

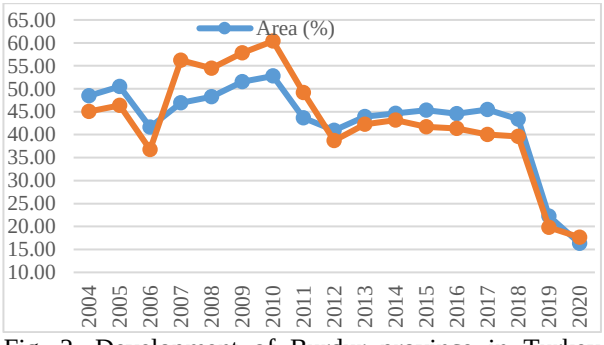


Fig. 2. Development of Burdur province in Turkey anise cultivation area and its share in production
Source: Own design and calculation based on [14]

The fact that the share in the production amount was higher than the share in the cultivation area in 2007-2010 can be explained by the fact that the anise yield of Burdur province per unit area in the mentioned years was higher than the anise yield values of Turkey (Fig. 2).

In 2020, the most crucial anise producing districts in Burdur province at the district level was Tefenni, Çavdır, Yeşilova, Karamanlı and Gölhisar, respectively. These mentioned districts also constitute the research area and cover almost the entire province of Burdur both in anise cultivation area and anise production amount. The Tefenni district, which shares 41.40% of the Burdur anise cultivation area, is 52.46% of the production amount. This is explained by the fact that the anise yield of the Tefenni district is above the anise yield average of Burdur province. Suppose the shares of other neighbourhoods forming the research region in the cultivation area of Burdur province are above the shares of Burdur province in the amount of anise production. In that case, it indicates that the anise yield of these four districts is below the anise yield average of Burdur province (Table 2).

Table 2. Burdur anise cultivation area, yield and production (2020)

Districts	Cultivation area (da)	The share of cultivation area in Burdur province (%)	Yield (kg/da)	Production (ton)	Share of production in Burdur province (%)
Tefenni	10,500	41.40	94	992	52.46
Çavdır	6,243	24.62	56	350	18.51
Yeşilova	4,190	16.52	65	272	14.38
Karamanlı	2,000	7.89	60	120	6.35
Gölhisar	1,900	7.49	60	114	6.03
Merkez	275	1.08	84	23	1.22
Kemer	170	0.67	65	11	0.58
Altınyayla	60	0.24	117	7	0.37
Bucak	24	0.09	83	2	0.11
Burdur	25,362	100.00	75	1,891	100.0

1 decares = 0.1 hectares
Source: [14].

Anise is one of the medicinal and aromatic plants with high economic returns in Turkey and Burdur, which is also essential in rural development. It is seen that there has been a decrease in anise production in Burdur, which is a historically critical province in anise production. This study aimed to determine the economic structure and the factors that cause the production shrinkage in the region, identify the emerging problems, and develop solutions.

MATERIALS AND METHODS

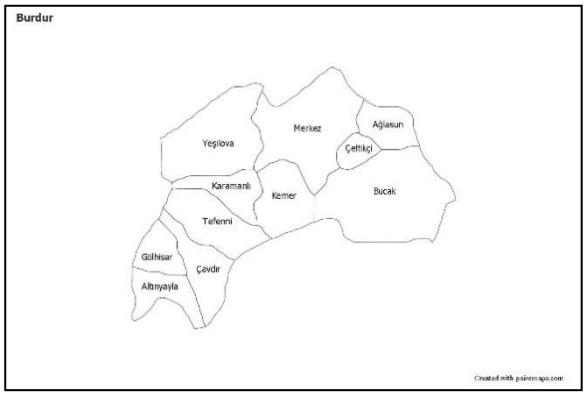
The material of the study consisted of the data obtained by using the survey method from the agricultural farms and stakeholder engaged in anise cultivation in the province of Burdur. The research data belonged to the 2020 production season.

The main mass of the enterprises from which the data used in the research were obtained consisted of farms operating in the field of anise cultivation in Yeşilova, Tefenni, Karamanlı, Çavdır and Gölhisar districts of Burdur province (Fig. 3) (98% of anise production in Burdur province). Since it would not be possible to survey all farms in the main population in terms of time and economy, the farms to be observed were selected by the Stratified Sampling method [16]. The Neyman Method was used to determine the number of samples for the survey application and distribute the sample numbers to the strata [4]. It was calculated from the main population that 159 anise farmers should be interviewed with a 5% deviation from the anise field average and within the 95% confidence limit (Table 3).

The enterprises engaged in anise production were divided into three layers according to the frequency distribution, taking into account the size of the anise cultivated area. Farmers with an anise cultivation area of 14.99 decares or less formed the I. group, and it was calculated that 58 anise producers from this group should be interviewed. The farms that realise anise cultivation area between 15.00-29.99 decares expressed as an II. group. It was determined that 28 anise producers from this group should be interviewed. Enterprises with an anise cultivation area of 30.00 decares or more were created in the III. group. It was calculated that 73 anise producers from this group should be

interviewed. Therefore, the sample size and the number of anise producers to be interviewed were 159 farms (Table 3).

In Burdur province, 159 farm samples were calculated by considering the anise cultivation areas in 2019. The distribution was made taking into account the cultivation area share of the districts. Accordingly, 71 farms from Yeşilova district, 33 farms from Karamanlı district, 31 farms from Tefenni district, 19 farms from Çavdır district and five farms from Gölhisar district were calculated.



Map 1. Research area map
Source: [17].

Table 3. Sampling size in anise cultivation

Groups	Anise area lower and upper limits (da)	N	Standard deviation	Variance	Average anise field size (da)	n
I	1.00-14.99	888	3.7	13.7	7.2	58
II	15.00-29.99	378	4.2	17.8	20.7	28
III	30.00 +	221	18.7	350.3	50.0	73
Total		1,487	16.9	286.7	17.0	159

Source: Own calculation.

In the study, to determine the product's situation for the stakeholders in the anise marketing channel, data were obtained by interviewing one processor factory operating in the research area.

The necessary data for the analysis were obtained through face-to-face surveys from the farms operating in anise cultivation in Burdur province. The questionnaire form, which was created according to the purpose of the research from the determined farms, was filled by the researcher by going to the producers in the villages in the relevant research region through face-to-face interviews, and these data were transferred to the computer environment, calculations were made in statistical package programs and charts were created. These charts were interpreted with absolute and relative distributions and simple weighted averages.

The single product budget analysis method was used to determine the operating costs in anise farming. According to this method, income and expense status was calculated only for anise, the research subject, not for all products grown in an agricultural enterprise. Production period cost charts were created in anise production. The charts included the labour force, tools and equipment, and the amounts used in performing various operations. The amount of labour and tool equipment used in the production activity was calculated in hours.

The family labour wage provision calculation was determined by taking into account the foreign labour wages in the research region. The amount of fertiliser used per decare in anise production was given as the total of plant nutrients. Since the partial budget analysis was made in the research, the machine rental prices were taken as a basis, although the farmers use their own machines. 3% of total variable costs were calculated as general administrative expenses. Revolving fund interest, variable costs were calculated as half of the current interest rate applied by T.C. Ziraat Bank to crop production loans. Land rent costs for anise were also considered in the cost of land rent in the research area, even though the farmers' owners use their own land.

The gross production value was calculated by multiplying the amount of product obtained due to anise production activity and the sales price. In calculating the gross profit for anise, the formula "gross production value of anise – variable costs of anise" was used. Absolute (net) profit was determined by subtracting the total cost of anise production from the gross production value. The relative profit was calculated as the ratio of the gross production value of anise to the total production costs for anise [1], [6], [9].

RESULTS AND DISCUSSIONS

The "Neyman Method" used for sampling takes more samples from the layer with high variance. For this reason, the regional weighted average was also determined. Gül [7] and Gül [8]'s regional weighted average approach was used. Therefore, the number of frequencies and the total number of frequencies were proportioned to the population of the enterprise size groups. A coefficient was obtained for each layer, and the values calculated for each group (layer) were multiplied by this coefficient and the region weighted average was calculated.

Some Characteristics of Farmers and Farms

The average age of the farmers in the examined enterprises was 52.37 years. As the anise planting scale of the farms grew, the average age decreased. The average education period of the farmers was determined as 8.00 years. The experience period of the operators in crop production was found to be 28.65 years, and the experience period in anise production activity was found to be 25.74 years. Approximately 60.00% of the surveyed enterprises had non-agricultural income (Table 4). It was determined that 57.86% of the operators were engaged in livestock production activities. The credit card usage rate in businesses was found to be 69.18%. As the anise farms scale grew, the rate of credit card usage increased. When the debt status of the examined enterprises in the last five years was questioned, 43.40% of the operators had an increase in their debt situation in the previous five years. Almost all of the interviewed operators had social security (98.74%). The enterprises' leaf and soil analyses were very low. 71.07% of the operators were members of an agricultural organisation, 44.65% were members of Agricultural Credit Cooperative, and 52.20% were members of Pankobirlik. 43.40% of the operators reported that they received livestock support, 52.83% fertiliser and 50.94% diesel support (Table 4).

The knowledge level of the operators in anise production, their satisfaction level in anise production and their tendency to continue anise production were found to be slightly above the medium level. As the scale of anise farmland grew, these three levels increased. The debt per enterprise in the examined enterprises was calculated as 39,393.09 TRY (Table 4).

Table 4. Some characteristics of the operator

	Groups			
	I	II	III	Farms average
Operator age (years)	55.53	51.96	50.01	52.37
Operator education level (years)	8.34	8.46	7.55	8.00
Experience of the operator in plant production (years)	31.00	28.93	26.67	28.65
Experience of the operator in anise production (years)	27.97	23.93	24.66	25.74
Has non-agricultural income (%)	67.24	71.43	49.32	59.75
Animal husbandry (%)	55.17	50.00	63.01	57.86
Credit card ownership (%)	62.07	64.29	76.71	69.18
Borrower (%)	51.72	60.71	61.64	57.86
Increasing indebtedness in the last five years (%)	37.93	53.57	43.84	43.40
Having social security (%)	98.28	96.43	100.00	98.74
Having had leaf analysis (%)	0.00	0.00	2.74	1.26
Soil analysis (%)	0.00	3.57	6.85	3.77
Member of an agricultural organisation (%)	67.24	71.43	73.97	71.07
Member of Agricultural Credit Cooperative (%)	50.00	39.29	42.47	44.65
Pankobirlik member (%)	50.00	53.57	53.42	52.20
Using agricultural credit (%)	41.38	46.43	54.79	48.43
Receiving livestock support (%)	34.48	35.71	53.42	43.40
Receiving fertiliser support (%)	44.83	60.71	56.16	52.83
Receiving diesel support (%)	43.10	57.14	54.79	50.94
Tendency to continue anise production	2.98	3.36	3.57	3.32
Knowledge level in anise production	3.09	3.1	3.15	3.12
Satisfaction level with anise production	2.55	2.64	3.13	2.82
Number of credit cards	1.96	2.28	2.6	2.31
The debt amount (TRY)	32,367.94	29,166.67	50,902.99	39,393.09

Source: Own calculation. 1 USD = 7.02 TRY

The average household population on farms was between 3-4 people. As farm size groups increased, the household population also increased. 51.74% of the household population of 3.25 people in enterprises was male, and 48.26% was female.

The majority of the farm's population consisted of primary, secondary and high school graduates. The proportion of the household population who graduated from primary school was 44.03%, middle school 15.17%, high school 26.64%, associate degree 3.46%, and undergraduate 7.33%.

Anise production activity constituted 13.79% of the total gross production value obtained from agricultural production in the examined enterprises. In the research region average, the contribution of anise production activity to GPV was 9.94%. While the share of GPV obtained from other plant production activities in the total GPV was 36.80%, the percentage of GPV obtained from animal production in the total GPV was 45.56%. The rate of 3.85% was the share of agricultural support received from the state in the total GPV.

The anise cultivation area of the examined enterprises was 28.33 decares on average. The enterprise itself owned 67.77% of the total anise cultivation area. The remainder consisted of lands that were rented out. Among the farm width groups, the rate of anise land being owned by the operator varied between 61.40% and 86.28%. The farm group in which the operator's rate of anise land was the highest first group. Large-scale enterprises used to lease 38.60% of the land they cultivated anise.

The anise cultivation area, which was 28.33 decares on the farm average, was 13.65 decares (48.19%) of irrigated land and 14.68 decares (51.81%) of dry land. As the farm width groups increased, the irrigation rate of the anise land increased. However, anise cultivation in the region was generally grown on barren lands.

The areas where anise cultivation was carried out in the enterprises consisted of an average of 3.79 parcels. The average parcel width was 7.47 decares. As the scale of anise cultivation grew, the number of parcels and the width of the parcels also increased. The number of parcels of anise land in the farm width groups varied between 2.00 and 5.45. The parcel size in the farm width groups also differed between 5.22-8.28 decares (Table 5).

Table 5. Number and size of anise land plots

Groups	Number of parcels	Parcel size (decare)
I	2.00	5.22
II	3.18	6.80
III	5.45	8.28
Farms average	3.79	7.47
Regional average	2.81	6.55

Source: Own calculation.

Use of Labour and Machinery in Anise Production

On average, 498.79 hours of foreign labour and 112.92 hours of family labour were used in anise production. The use of foreign labour was calculated as 17.60 hours per decare. It was determined that family labour was used for 3.99 hours per decare. On the average of farms, 81.54% of the workforce use was met by the foreign workforce and 18.46% from the family workforce. Machine usage within the enterprise width groups changed between 1.43-2.50 hours per decare. Machine usage was calculated as 1.64 hours per decare in the average of enterprises (Table 6).

Table 6. Use of labour and machinery in anise production

	Groups				
	I	II	III	FA	RA
Foreign workforce (hours)	189.16	484.39	750.33	498.79	347.61
Family workforce (hours)	74.79	88.71	152.51	112.92	89.88
Total workforce (hours)	263.95	573.11	902.84	611.72	437.49
Foreign labour per decare (hour)	18.13	22.42	16.62	17.60	18.86
Family labour per decare (hour)	7.17	4.11	3.38	3.99	4.88
Total workforce per decare (hour)	25.30	26.52	20.00	21.59	23.74
Foreign workforce (%)	71.66	84.52	83.11	81.54	79.46
Family workforce (%)	28.34	15.48	16.89	18.46	20.54
Total workforce (%)	100.00	100.00	100.00	100.00	100.00
Machine power (hours)	26.12	40.61	64.63	46.35	35.53
Machine power per decare (hour)	2.50	1.88	1.43	1.64	1.93

FA: farms average; RA: Regional average
Source: Own calculation.

As the farm width groups increased, machine power per decare decreased (Table 6).

Production Costs in Anise Production

Production cost is the sum of fixed and variable costs. Fixed cost is the costs that occur whether or not production is realised and are not dependent on production volume. Fixed costs consist of general administrative expenses, permanent workforce and land rent [12].

On the other hand, variable costs are expenses that vary according to the production volume and occur as long as the production takes place. Variable cost elements are machinery rent, seeds, fertilisers, pesticides, irrigation costs, temporary labour wages, marketing costs and revolving fund interest [12].

According to the groups, the variable cost total in the enterprises was an average of 632.31 TRY per decare in the I. group, 657.95 TRY per decare in II. group, and it was found as 568.24 TRY per decare in the III. group. The variable cost of 588.89 TRY per decare was used based on the enterprise and was calculated as 616.63 TRY in the region average (Table 7).

While the total cost that changes based on the enterprise was 16,685.19 TRY on average, the regional average was 11,364.52 TRY. Among the variable cost elements, temporary labour, machinery rental, and fertiliser costs accounted for more than half of the variable costs (59.46%). Temporary labour costs were 29.25%, machinery rental 17.82%, fertiliser 12.39%, marketing 10.16%, irrigation 8.58%, seeds 8.15% and pesticides were 7.99% among the total variable costs (Table 7).

Fixed cost elements in anise production activity were general administrative expenses, permanent labour expenses and land rent. The total fixed cost per unit area (decare) in farm width groups changed between 140.05 TRY and 181.27 TRY. The fixed cost per unit area (decare) was calculated as 150.44 TRY in the average of the enterprises interviewed. It was determined that the fixed cost per unit area in anise production in the region average in 2020 was 164.57 TRY. The most important fixed cost element was land rent (Table 7).

Table 7. Production cost in anise production

Cost elements	Groups			FA	RA
	I	II	III		
	Amount per decares (TRY)				
Machine rental	156.83	108.48	94.80	104.97	119.84
Seed	44.59	48.43	48.56	48.01	47.18
Fertiliser	75.85	75.47	71.95	72.95	74.32
Pesticide	38.19	49.32	48.25	47.05	45.17
Water	46.79	47.17	51.79	50.50	48.72
Temporary workforce	179.09	228.09	160.75	172.26	187.02
Marketing	55.19	63.75	59.96	59.83	59.47
Revolving fund interest	35.79	37.24	32.16	33.33	34.90
Variable cost total	632.31	657.95	568.24	588.89	616.63
General administrative expenses	18.97	19.74	17.05	17.67	18.50
Permanent-family workforce	82.36	46.91	38.82	45.75	55.94
Land rent	74.92	114.62	84.19	87.03	90.12
Fixed cost total	176.24	181.27	140.05	150.44	164.57
Production cost	808.55	839.21	708.29	739.33	781.19
	Share (%)				
Machine rental	19.40	12.93	13.38	14.20	15.34
Seed	5.52	5.77	6.86	6.49	6.04
Fertiliser	9.38	8.99	10.16	9.87	9.51
Pesticide	4.72	5.88	6.81	6.36	5.78
Water	5.79	5.62	7.31	6.83	6.24
Temporary workforce	22.15	27.18	22.70	23.30	23.94
Marketing	6.83	7.60	8.47	8.09	7.61
Revolving fund interest	4.43	4.44	4.54	4.51	4.47
Variable cost total	78.20	78.40	80.23	79.65	78.93
General administrative expenses	2.35	2.35	2.41	2.39	2.37
Permanent-family workforce	10.19	5.59	5.48	6.19	7.16
Land rent	9.27	13.66	11.89	11.77	11.54
Fixed cost total	21.80	21.60	19.77	20.35	21.07
Production cost	100.00	100.00	100.00	100.00	100.00

Source: Own calculation.

The land rent, which was 87.03 TRY on average for farms, was 90.12 TRY on the regions' average. It was calculated that the permanent labour cost varied between 38.82 TRY and 82.36 TRY per decare. General administrative expenses varied between 17.05 TRY and 19.74 TRY per decare in farm groups (Table 7).

The permanent labour cost per decare in I. group enterprises was 82.36 TRY, 46.91 TRY in II. group enterprises, and 38.82 TRY in III. group enterprises. Land rent values differ within enterprise width groups. The land rent paid per decare is 74.92 TRY in I. group enterprises, 114.62 TRY in II., and 84.19 TRY in III. group farms (Table 7).

The share of general administrative expenses in total fixed costs in operating averages was 11.74%. The percentage of permanent labour costs in total fixed costs was 30.41%. The share of land rents in total fixed costs was 57.85% (Table 7).

In their anise feasibility report, Ayhan et al. [2] calculated that the total costs per decare in anise production was 721.40 TRY. Production cost calculations made in this study were also done by Ayhan et al. [2] and were close to the findings.

Profitability Indicators in Anise Production

It was determined that the average production cost per decare was 739.33 TRY. The production cost per decare ranged between 708.29 TRY and 839.21 TRY in the farm's width groups. Anise yield was 83.93 kg in the average enterprises and 85.02 kg in the region's average (Table 8).

GPV per decare was 1,224.27 TRY in anise producing enterprises where the research was conducted. GPV per decare varied between 1,208.80 TRY and 1313 TRY in enterprise width groups (Table 8).

In their anise feasibility report, Ayhan et al. [2] determined the GPV per decare of anise production as 1,760 TRY. In our study, the GPV was around 1,200-1,300 TRY. We calculated the gross profit by subtracting the total variable costs from the gross production value. The average gross profit per decare of the interviewed enterprises was 635.38 TRY. Gross profit per decare was calculated as between 587.47 TRY, and 655.06 TRY in enterprise width groups (Table 8).

Ayhan et al. [2] calculated the gross profit per decare in anise production as 1,038.60 TRY in the anise feasibility report. Our study determined that the gross profit per decare ranged between 590-655 TRY. It was calculated that the gross profit per unit area in the research area was lower.

In anise production, the absolute profit per decare was determined as 484.93 TRY in the average of the enterprises. This value varied between 411.23 TRY and 500.51 TRY in farm width groups (Table 8).

The relative profit in anise production activity in the average of enterprises was 1.66. It was calculated that every 1 TRY used for production provides a profit of 66 kuruş. This value was calculated as 1.59 in the regional average. Relative profit in anise operating width groups varied between 1.51 and 1.71 values (Table 8).

Variable Cost/GPV was 0.48, and Fixed Cost/GPV was 0.12 in the average of enterprises. Therefore, the Total Cost/GPV ratio was calculated as 0.60. Since the production costs are the sum of the variable cost and fixed cost, 60% of the GPV from the anise production was used for the production costs. In other words, 60 kuruş of every 1 TRY of income generated constituted the production costs. 12 kuruş of 1 TRY GPV was going towards fixed costs. The portion of 48 kuruş was the variable cost (Table 8).

Ayhan et al. [2], in the anise feasibility report they prepared, found the benefit/cost ratio in anise production activity as 2.44. They stated that anise production activity was a profitable production activity.

In the enterprises where anise production activities were carried out, the production cost of 1 kg of anise was 8.81 TRY, and 9.19 TRY in the region's average. As the farm width groups increased, the production cost of 1 kg anise decreased. The production cost of 1 kg of anise was 9.66 TRY in I. group farms, 9.44 TRY in II., and 8.53 TRY in III. group farms. In addition, the average sale price of 1 kg of anise was 14.59 TRY, and 14.63 TRY in the regional average (Table 8).

Table 8. Profitability indicators in anise production

Indicators	Groups			FA	RA
	I	II	III		
Variable cost (TRY per farm)	6,595.66	14,216.34	25,648.49	16,685.19	11,364.52
Variable cost (TRY per decare)	632.31	657.95	568.24	588.89	616.63
Fixed cost (TRY per farm)	1,838.39	3,916.67	6,321.37	4,262.60	3,032.96
Fixed cost (TRY per decare)	176.24	181.27	140.05	150.44	164.57
Production cost (TRY per farm)	8,434.05	18,133.01	31,969.86	20,947.79	14,397.48
Production cost (TRY per decare)	808.55	839.21	708.29	739.33	781.19
Production (TRY per farm)	873.17	1,920.79	3,749.07	2,378.04	1,566.90
Yield (TRY per decare)	83.71	88.90	83.06	83.93	85.02
GPV (TRY per farm)	12,723.56	28,370.29	54,561.56	34,687.60	22,919.03
GPV (TRY per decare)	1,219.78	1313.00	1208.80	1,224.27	1,243.57
Gross profit (TRY per farm)	6,127.90	14,153.94	28,913.07	18,002.41	11,554.51
Gross profit (TRY per decare)	587.47	655.06	640.56	635.38	626.94
Absolute profit (TRY per farm)	4,289.51	10,237.27	22,591.69	13,739.81	8,521.55
Absolute profit (TRY per decare)	411.23	473.79	500.51	484.93	462.37
Relative profit	1.51	1.56	1.71	1.66	1.59
Production cost/GPV	0.66	0.64	0.59	0.60	0.63
Variable cost/GPV	0.52	0.50	0.47	0.48	0.50
Fixed cost/GPV	0.14	0.14	0.12	0.12	0.13
Per 1 kg anise cost (TRY)	9.66	9.44	8.53	8.81	9.19
Per 1 kg anise sales price (TRY)	14.57	14.77	14.55	14.59	14.63

Source: Own calculation.

The real price and volatility

Anise farmers' prices were calculated as real prices (2003 prices), taking into account the 2003=100 monthly Producer Price Index (PPI)[14]. The volatility in agricultural product prices, and the associated uncertainty, is one of the main factors affecting the income security of producers and traders, which threatens the performance of agriculture and the welfare of consumers [11][15].

When the prices of anise per kilogram of real producers for Turkey and Burdur in 1980-2021 were examined, they exhibited a strongly fluctuating and increasing trend. Anise prices, which farmers received from Turkey, were in the band of 1.146 TRY-3.733 TRY per kg in 1980-1989, reached their peak value in 1987, prices were very fluctuating and tended to increase. The price volatility received by the producer was 51.56%. Anise prices in Burdur were very volatile and tended to increase. Price volatility was also above the Turkey average with a rate of 67.90%. Anise real prices, which were in the band between 1.781 TRY and 3.213 TRY per kg in 1990-1999, became less volatile. Price volatility declined to 19.56%. For the province of Burdur, it was in the range of 1.743 TRY-3.263 TRY per kg, and price volatility decreased to 19.77%. However, it was above the Turkey average (Fig. 3).

Anise's actual prices in Turkey were 2.373 TRY per kg on average between 2000 and 2010 and rose to 1.841 TRY-3.885 TRY per kg, and followed a more fluctuating course compared to the 1990s. It had its lowest values in 2006, 2008 and 2007, and kg anise prices were below 2.0 TRY in these years. Prices were more volatile than in the 1990s, and the price volatility increased to 25.88%. Anise prices in Burdur were very volatile and continued to grow, and price volatility increased to 45.17%, and price volatility in Burdur was above the Turkey average (Fig. 3).

In Turkey, real prices of kg anise increased to 2.479 TRY on average in 2011-2021 and fluctuated less in the band of 1.969 TRY-3.525 TRY compared to 2000-2010. It reached its peak value in 2019 and the lowest value in 2017. Price volatility dropped to 22.16%. After anise prices in Burdur were in the band of 1.814 TRY and 2.443 TRY in 2011-2018, the kg price increased by more than 3.0 TRY in 2019 and 2020 and decreased to 2.709 TRY in 2021. Although the price volatility decreased to 35.69%, this rate was high, and the price volatility in Burdur was also above the Turkey average (Fig. 3).

When the producers' prices of anise per kg of real for Turkey and Burdur in 1980-2021 were examined, there was a strongly fluctuating and increasing trend in prices, which were

2.428 TRY and 2.405 TRY per kg on average. The coefficient of variation was 23.37% for Turkey and 24.76% for Burdur. Price volatility was 28.10% for Turkey and 40.51% for Burdur province. The coefficient of variation and price volatility in Burdur were above the Turkey average (Fig. 3). Therefore, one reason for the decline in the anise cultivation areas in Burdur province was this change and price volatility.

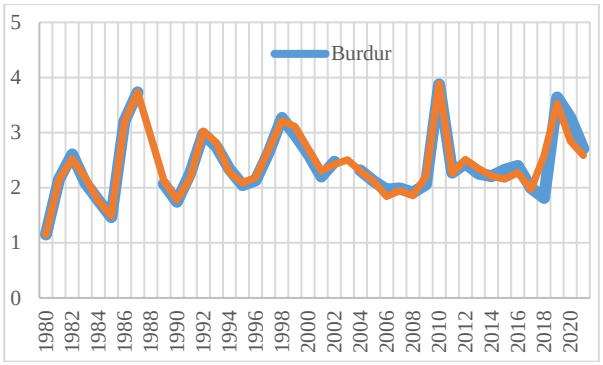


Fig. 3. Anise real prices (TRY per kg) received by farmers in Turkey and Burdur
Source: Own design and calculation based on [14].

There was a direct and high correlation between the prices of anise per kg that real producers in Burdur have obtained and the anise cultivation areas of Turkey, anise production in Turkey and anise prices in Turkey.

CONCLUSIONS

This study covers the data of 159 anise producers in the province of Burdur, which has an essential place in Turkey's total anise cultivation area and production amount, and the data of the 2020 production period, the socio-economic structures of the farms were examined. In addition, the profitability of anise production activity was analysed in line with production costs and profitability indicators.

The average age of anise producers was 52.37 years, their education period was 8.00 years, their experience in crop production was 28.65 years, and their experience in anise production was 25.74 years. Most of the anise producers were primary, secondary and high school graduates (86.26%).

The household size of anise producers was 3.25 people on average. The population ratio between 15-49 made up 51.55% of the total population. This ratio is also essential in meeting its own workforce needs.

The surveyed farms' farmland width was 113.90 decares on average. 81.49 decares of these lands were property, and 32.16 decares were rented. Anise land width was 28.33 decares on average, 3.79 parcels and 7.47 decares on average. In addition, 63.01% of the farm interviewed were engaged in livestock production. Farms' non-agricultural income rate was 59.75%.

Anise production accounted for 13.79% of the GPV obtained by farms. On the farm's average, anise production cost was calculated as 739.33 TRY per decare. The cost of 1 kg of anise was 8.81 TRY, and the selling price of 1 kg was 14.59 TRY. The profit margin was 5.78 TRY for 1 kilogram of anise.

GPV per decare obtained from anise production activity was calculated as 1224.27 TRY. The gross profit was determined as 635.38 TRY per decare. The relative profitability of the anise production activity was 1.66. This value meant that every 1 TRY used by enterprises in anise production returned to the enterprise as 1.66 TRY. Therefore, this situation explained that farms made a profit of 0.66 TRY for every 1 TRY.

It is essential to give anise-specific support because the anise plant is a more sensitive product than other products. It is more affected by natural conditions, and its cultivation requires more effort than other products.

For Turkey and Burdur province, the prices of kg anise received by real producers were 2.428 TRY, and 2.405 TRY in the average of 1980-2021 years. There was a severe fluctuation in prices and showed an increasing trend. The coefficient of variation was relatively high. The coefficient of variation was calculated as 23.37% for Turkey and 24.76% for Burdur. Likewise, the real price volatility of anise was relatively high. The volatility was 28.10% for Turkey and 40.51% for Burdur province. The coefficient of variation and price volatility in Burdur were

also above the Turkey average. At this point, one of the reasons for the shrinkage in anise cultivation areas in Burdur province can be expressed as the high variation and volatility in these prices. To eliminate price instability and volatility of anise producers and overcome the problems encountered in anise production, producers should act in an organised manner as a union/cooperative. For this, anise producers should establish their organisations.

In addition to these, extension activities should be carried out. The relevant institutions of the state should hold information meetings through experts for producers who are engaged in anise production activities and intend to produce anise in the coming years.

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