

COST AND PROFITABILITY ANALYSIS IN CARNATION PRODUCTION: THE CASE OF ISPARTA PROVINCE, TÜRKİYE

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Abstract

In this study, it was aimed to analyze the cost and profitability of carnation production in Isparta province, Türkiye. The main material of the study was the data obtained by survey method from producers growing carnations in Isparta province. Data were collected by face-to-face interviews with producers. 25 producers were interviewed according to the complete count method. Farms were examined by dividing them into two groups according to their size. According to the research results, total land assets, carnation production area and number of parcels per farms II it was found to be higher in the group. Carnation area accounted for 85.70% of all land assets. It was found that the farms under investigation grew the Standard and Spray carnation kinds. Production costs per decare were lower in Group I. Production costs per branch were lower in the farms in Group II due to higher productivity. Average gross and net profit per decare II it was found to be higher in group farms. Profit margin per branch and the ratio of profit margin to sales price are similarly shown in the group II were higher in group farms. As a result, it can be said that large farms are more advantageous in terms of economic criteria. Therefore, it is important to support farmers in growing their carnation-producing regions.

Key words: Carnation, ornamental plants, economic analysis, Türkiye

INTRODUCTION

The industry for decorative plants, which contributes significantly to the production of plants, has an important place in the world thanks to its high added value and high export potential. Ornamental plants are preferred as a decorative element that brings happiness on special occasions and social events. Ornamental plants are divided into four groups: cut flowers, indoor ornamental plants, outdoor ornamental plants and natural flower bulbs [7].

The cut floriculture sector, which has a significant foreign trade value worldwide, is a rapidly developing investment area. In the early 20th century, this sector started to gain importance and today it is known to be cultivated in about fifty countries. The largest share in terms of production areas in the world belongs to Asian countries. The Asian continent is followed by the American continent and the European continent [10].

Türkiye has a lot going for it when it comes to growing beautiful plants because of its ideal

climate and geographic location, ease of access to other market nations, and inexpensive labor. 95% of high added value is produced in the ornamental plant industry [8]. Türkiye's advantageous geographic location, close proximity to market nations, and inexpensive labor force make it a perfect place to cultivate ornamental plants [8].

According to 2022 data, ornamental plants are produced on a total area of 5,687 ha in Türkiye. Outdoor plants and cut flowers constitute 70% and 26% of the production areas, respectively [12].

In Turkey, ornamental plant exports have been produced for around thirty-five years. In 2022, exports of ornamental plants and products came to a total of \$137.2 million. Roughly 36% of the export value of ornamental plants is made up of cut flowers. In 2022, Türkiye exported ornamental plants to 70 countries. The top three ornamental plant export destinations are the Netherlands, Germany and Uzbekistan. Other important export markets are Azerbaijan, England,

Georgia, Turkmenistan, Iraq, Russia and Italy [8].

Commercial production of cut flowers in Türkiye started in and around Istanbul in the 1940s and Yalova province has become an important production center. Yalova was followed by Antalya in the Mediterranean region and Izmir in the Aegean region [4].

Türkiye's cooperation with international organizations played an important role in the development of cut flower production. In the 1970s and 1980s, FAO (Food and Agriculture Organization of the United Nations) and the World Bank funded several research initiatives in the 1970s and 1980s to help Turkey's cut flower industry grow. [1].

Carnation ranks first in cut flower production in Türkiye. Rose and chrysanthemum follow carnation in second and third place. In 2022, a total of 986,298,552 carnations were produced in 14,665 da area in Türkiye. In carnation cultivation in Türkiye, Isparta province has a share of 28.05% in terms of production area and 24.64% in terms of production amount. According to these data, Isparta ranks second in Türkiye after Antalya [12].

The goal of this study was to examine the expenses and financial performance of producing carnations in the province of Isparta, which has a significant potential for producing carnations in Türkiye. Calculations were made for the study's general producer characteristics based on farm groups, land availability, kinds of carnations grown, production costs, and profitability indicators. It is believed that producers, prospective investors, and policy officials will find value in the data gathered from the study.

MATERIALS AND METHODS

The primary source of data for this research was the initial questionnaire-based data collected from carnation farms in the province of Isparta. Furthermore, comparable research, reports, and data on the topic produced by other people and organizations were also incorporated. The survey data pertains to the 2022 production period.

In line with the information obtained from the records of Isparta Provincial Directorate of

Agriculture and Forestry, the central district where carnation production is intensively carried out was selected as the research area. The total number of farms producing carnations in the central district is 28 and 25 farms were interviewed face to face. Since the land sizes of the farms differed from each other, it was decided that the farms should be divided into two groups in order to homogenize the population. Accordingly, the farms were classified as group I (1-24 decares; 12 farms) and group II (>24 decares; 13 farms). The data collected from the determined farms by questionnaire method were transferred to the computer environment, calculations were made in Microsoft Excel and SPSS programs and interpreted by creating charts. Independent sample t test was used to determine the significance levels of the variables between the farms groups. Significance levels of $p < 0.01$, $p < 0.05$ and $p < 0.10$ were selected.

The research region's foreign labor wages served as the foundation for calculating the family labor wage equivalent. The computation of general administration expenses involved deducting 3% from the overall variable costs. The variable costs multiplied by half of the interest rate (4.25%) that the Turkish Agricultural Bank applied to loans for crop production were used to compute interest on the revolving fund. Based on the producers' declarations in the research region, the rental cost of bare land was computed.

In the calculation of the annual depreciation of greenhouse capital, the straight line method was used, and the average economic life of the construction in plastic greenhouses was taken as 20 years [9]. Interest on plant capital was obtained by applying 5% interest to the half value of total plant costs [6]. The amount of product obtained as a consequence of the carnation manufacturing activity was multiplied by the sales price to get the gross production value. Gross profit was calculated by subtracting the difference of changing costs from the gross production value, and net profit was obtained by subtracting production expenses from that value. The ratio of gross

production value to production expenses yielded relative profit [11].

RESULTS AND DISCUSSIONS

Some characteristics of carnation producers are given in Table 1. It was found that the producers in Group II had more experience and a longer educational background than the producers in Group I. In the same way, the proportion of producers who received training on carnation cultivation, who were members of cooperatives, who met with extension staff and who used credit was higher in Group II. There was no significant difference between the groups in terms of the average age of the producers. In Group I, the number of family members was found to be larger. It was discovered that there was a statistically significant difference between the groups with regard to the length of the producers' education, the frequency of training in carnation cultivation, and the frequency of meetings with extension personnel.

Table 1. Producers' characteristics

Properties	Farm groups (da)		Mean	P-value
	I	II		
Age (year)	47.83	48.38	48.12	0.767
Education (year)	11.08	14.15	12.68	0.000*
Experience (year)	13.92	18.23	16.16	0.039
Population (person/family)	4.08	3.54	3.80	0.246
Receiving training on carnation cultivation (%)	16.67	61.54	44.00	0.070***
Membership of cooperative (%)	41.67	66.67	52.00	0.340
Meeting with publishing staff (%)	66.67	100.00	84.00	0.022**
Using credit (%)	83.33	92.31	88.00	0.510

*: p<0.01, **: p<0.05, ***:p<0.10

Source: Own calculation.

The land assets of the farm are given in Table 2. Total land per farm, land held for rent, carnation production area and number of parcels per farm were found to be higher in Group II. It was discovered that there was a statistically significant difference between the farm group averages. In accordance with the average of all farms, each farm had 6.36 plots and 37.49 da of land. Carnation area accounted for 85.70% of all land assets. When the ownership status of the lands is analyzed,

it is seen that the share of the land operated by tenancy is high. The rented rate was calculated as 80.26%.

Table 2. Land availability in farms

	Farm groups (da)		Mean	P-value
	I	II		
Total land size (da/farm)	16.35	57.00	37.49	0.000*
Carnation land size (da/farm)	11.02	51.62	32.12	0.000*
Property land size (da/farm)	7.50	7.31	7.40	0.963
Rent land size (da/farm)	8.85	49.69	30.09	0.000*
Number of parcels (numbers/da)	3.58	8.92	6.36	0.000*

*: p<0.01, **: p<0.05

Source: Own calculation.

Table 3 shows the carnation kinds grown by the producers along with the percentage of farmers who grow these varieties. The two carnation kinds that were grown on the farms under investigation were found to be Standard and Spray. Based on the average of all farms, it was discovered that 20% of farms were growing only the Standard type, 24% were growing only the Spray kind, and 56% were growing both varieties simultaneously. The percentage of farms cultivating both carnation kinds together was higher in Group I and Group II farms, according to an analysis of farming groups. According to a survey by Ozdemir [10] in the region of Antalya, a larger percentage of farms (49%) grew both Standard and Spray types simultaneously.

Table 3. Carnation varieties produced in farms

	Farm groups (da)				Mean	(%)
	I (n)	(%)	II (n)	(%)		
Standard	4.00	33.33	1.00	7.69	5.00	20.00
Spray	2.00	16.67	4.00	30.77	6.00	24.00
Standard and Spray	6.00	50.00	8.00	61.54	14.00	56.00
Total	12.00	100.00	13.00	100.0	25.00	100.00

Source: Own calculation.

The cost elements of carnation production activity are classified as fixed and variable costs. A cost that changes according to the amount of output is called a changing cost. Conversely, fixed costs are expenses that are independent of production volume; that is, they are incurred whether or not production is

undertaken [5]. Table 4 lists the cost components and production shares of carnations for each farm. According to farm groups, the average cost of producing one decare of carnations was determined to be 107,093.24 TL, Group II's cost was 111,083.26 TL, and Group I's cost was 101,524.87 TL. As a result, Group I had lower manufacturing costs per decare than Group II. The group average differences were determined to be statistically significant ($p < 0.01$).

The mean value of all farms indicates that 64.49% of total production costs are

attributable to variable expenses, while 35.51% are attributable to fixed costs. Upon analyzing the cost components, seedlings ranked first (at 22.99%), followed by permanent labor (18.99%), fertilizer (13.39%), plastic sheeting (11.10%), and chemical pesticides (10.27%) in terms of input expenses overall. These five inputs account for 76.74% of total production expenses. In a research by Ozdemir [10] in the province of Antalya, the proportion of fixed costs to total production costs in the carnation industry was 47.67% and the proportion of variable costs was 52.33%.

Table 4. Production costs in farms (TL/da)

Cost items	Farm groups (da)				Average	(%)	P-value
	I	(%)	II	(%)			
Seedling	24,375.00	24.01	24,850.00	22.37	24,622.00	22.99	0.5523
Tool-machine rental	1,200.00	1.18	1,223.08	1.10	1,212.00	1.13	0.1125
Plastic sheeting	12,527.78	12.34	11,288.46	10.16	11,883.33	11.10	0.2214
Chemical pesticides	11,333.33	11.16	10,692.31	9.63	11,000.00	10.27	0.6074
Fertilizer	15,916.67	15.68	12,892.31	11.61	14,344.00	13.39	0.1481
Electricity and water	1,544.19	1.52	1,274.97	1.15	1,404.20	1.31	0.2211
Rope	1,466.67	1.44	1,619.23	1.46	1,546.00	1.44	0.2050
Product insurance	-	0.00	461.54	0.42	240.00	0.22	-
Revolving fund interest	2,905.45	2.86	2,732.83	2.46	2,815.69	2.63	0.2550
Variable cost (A)	71,269.09	70.20	67,034.72	60.35	69,067.22	64.49	0.2550
Administrative costs (A*0.03)	2,138.07	2.11	2,011.042	1.81	2,072.02	1.93	0.2550
Permanent labor	17,583.33	17.32	21,734.62	19.57	20,340.00	18.99	0.0203**
Depreciations	4,018.75	3.96	10,680.77	9.62	7,483.00	6.99	0.0000*
Interest	2,565.62	2.53	5,745.19	5.17	4,219.00	3.94	0.0000*
Land rent	3,950.00	3.89	3,876.92	3.49	3,912.00	3.65	0.6680
Total fixed costs (B)	30,255.78	29.80	44,048.54	39.65	38,026.02	35.51	0.0000*
Total production cost (A+B)	101,524.87	100.00	111,083.26	100.00	107,093.24	100.00	0.0000*

*: $p < 0.01$, **: $p < 0.05$

Source: Own calculation.

When evaluating the competitiveness of production activities, gross profit is a key performance indicator [3].

Gross, net and relative profits per decare in carnation production are given in Table 5. The table shows that Group II farms had larger gross, net, and relative profits for each decare than Group I farms. By averaging I., II., and all farms, gross profit per decare was computed as 63,697.92, 94,787.77, and 79,769.18 TL. There was determined to be a statistically significant difference ($p < 0.01$) between the groups. In Group I, the net profit per decare was 33,442.14 TL; in Group II, it

was 50,739.23 TL; and in the average of all farms, it was 41,743.16 TL. A significantly significant difference ($p < 0.05$) in net profit per decare was seen between the farm groups. Relative profit is another metric used to assess the performance of production branches. Group II farms had a relative profit of 1.46, while Group I farms had a relative profit of 1.33. It was determined that there was a statistically significant difference ($p < 0.10$). 1.39 was found to be the relative profit based on the average of all farms. These findings suggest that large farms outperform small farms in terms of profitability. A study by

Barlas et al. [2] in İzmir province found that carnation production was more profitable than other cut flower species, and a study by

Ozdemir [10] in Antalya province found that gross and net profit per decare increased in tandem with the size of the farm.

Table 5. Profitability indicators of farms

Indicators	Farm groups (da)		Average	P-value
	I	II		
Yield (branch /da)	112,083.33	132,307.69	122,600.00	0.020**
Price (TL/branch)	1.20	1.22	1.21	0.168
Gross product value (TL/da)	134,967.01	161,822.49	148,836.40	0.007*
Variable costs (TL/da)	71,269.09	67,034.72	69,067.22	0.255
Production costs (TL/da)	101,524.87	111,083.26	107,093.24	0.000*
Gros profit (TL/da)	63,697.92	94,787.77	79,769.18	0.004*
Net profit (TL/da)	33,442.14	50,739.23	41,743.16	0.043**
Relative return	1.33	1.46	1.39	0.085***

*: p<0.01, **: p<0.05, ***:p<0.10

Source: Own calculation.

Table 6 provides the profit margin and the profit margin to sales price ratio for a single carnation. One carnation's sales price was subtracted from the production costs to determine the profit margin. It was discovered that Group II farms had a larger profit margin than Group I farmers. There was

a statistically significant difference (p<0.05) between the groups. For each branch carnation, the profit margin was calculated as follows: 0.30 TL for farms in Group I, 0.38 TL for farms in Group II, and 0.34 TL for the average of all farms.

Table 6. Profit margin of 1 branch of carnation in farms

Indicators	Farm groups (da)		Average	P-value
	I	II		
Production costs (TL/da)	101,524.87	111,083.26	107,093.24	0.000*
Yield (branch/da)	112,083.33	132,307.69	122,600.00	0.020**
Production cost per branch (TL/branch)	0.91	0.84	0.87	0.116
Price per branch (TL/branch)	1.20	1.22	1.21	0.168
Profit margin (TL/branch)	0.30	0.38	0.34	0.050**
The ratio of profit margin to sales price (%)	24.78	31.35	28.05	0.064***

*: p<0.01, **: p<0.05, ***: p<0.10

Source: Own calculation.

The amount that is profit and how much is expense in the carnation sales price was computed using the profit margin to sales price ratio (profit margin/sales price*100) criterion.

According to the average of all farms, this ratio was determined as 28.05%. According to these results, while the farms in Group II made a profit of 31.38% for every 1 carnation

they sold, the farms in Group I made a profit of 24.78%. The difference between the groups was statistically significant (p<0.10).

CONCLUSIONS

As a result, The average area used for carnation cultivation was found to be 32.12 da, and the producers' favorite cultivars were

Standard and Spray. Production expenses per decare and per branch were computed to be 107 093.24 TL and 0.87 TL, respectively, based on the average of all farms. In terms of total production expenses per decare, the top five items were seedlings (22.99%), permanent labor (18.99%), fertilizer (13.39%), plastic cover (11.10%), and chemical pesticides (10.27%). The net profit per decare was determined as 33,442.14 TL in Group I farms and 50,739.23 TL in Group II farms. The profit margin of 1 branch of carnation was determined as 0.30 TL in Group I farms and 0.38 TL in Group II farms. The ratio of profit margin to sales price was determined as 24.78% and 31.35% in Group I and II farms. These findings led to the conclusion that large farms had more advantages in terms of profitability metrics. Therefore, incentive measures should be taken to increase the capacity of the farms in the research region.

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REFERENCES

- [1]Aksu, M., Kusak, B., Kusak, L., 2016, Marmara bölgesinde süs bitkileri üzerine faaliyet gösteren işletmelerin Türkiye ekonomisindeki yeri. (The place of enterprises operating on ornamental plants in the Marmara region in the Turkish economy).VI. Ornamental Plants Congress, Antalya, pp. 105-120.
- [2]Barlas, S., Ormeci Kart, M.Ç., Kınıklı, F., Işın, Ş., 2019, İzmir ili Menderes ilçesinde kesme çiçek üreticilerinin üretim kararlarını etkileyen faktörler. (Factors affecting the production decisions of cut flower producers in Menderes district of Izmir province). Atatürk University. Journal of The Faculty of Agriculture., 50 (3): 231-238.
- [3]Erkus, A., Bülbül, M., Kırıl, T., Acil, A.F., Demirci, R.,1995, Tarım Ekonomisi. Ankara Üniv. Zir. Fak. Eğitim, Araştırma ve Geliştirme Vakfı Yayınları, Ankara (Farming economy. Ankara Univ. Zir. Fak. Education, Research and Development Foundation Publications, Ankara).
- [4]Hazar, D., Baktir, İ., 2016, Türk karanfilinin referansı: Antalya karanfil yetiştiriciliğinin dünü, bugünü ve yarını. (Reference of Turkish carnation: Yesterday, today and tomorrow of Antalya carnation

cultivation).VI. Ornamental Plants Congress, Antalya, pp. 43- 50.

[5]Inan, I.H., 2016, Tarım Ekonomisi ve İşletmeciliği. İdeal Kültür Yayıncılık,(Agricultural Economics and Management. Ideal Culture Publishing), p.415.

[6]Kırıl, T., Kasnakoglu, H., Tatlıdil, F.F., Fidan, H., Gündoğmus E., 1999, Tarımsal Ürünler İçin Maliyet Hesaplama Metodolojisi ve Veri Tabanı Rehberi. (Cost Calculation Methodology and Database Guide for Agricultural Products).Agricultural Economics Research Institute, publication number:37, Ankara.

[7]OAIB, 2023a, Orta Anadolu Süs Bitkileri ve Mamulleri İhracatçıları Birliği. Dünya Süs Bitkileri Sektör Raporu. (Central Anatolian Ornamental Plants and Products Exporters Association. World Ornamental Plants Sector Report). <http://www.susbitkileri.org.tr/images/d/library/c996523c-2367-42e9-9b91-b0e5d48e4a60.pdf>. Accessed on September 01, 2023.

[8]OAIB, 2023b, Orta Anadolu Süs Bitkileri ve Mamulleri İhracatçıları Birliği. Türkiye Süs Bitkileri Sektör Raporu. (Central Anatolian Ornamental Plants and Products Exporters Association. Türkiye Ornamental Plants Sector Report). <http://www.susbitkileri.org.tr/images/d/library/98e54002-0285-47c4-ad9f-09d2fddb7f65.pdf>. Accessed on September 01, 2023.

[9]Orük, G., Engindeniz, S., 2019, Muğla ilinde örtüaltı domates üretiminin ekonomik analizi üzerine bir araştırma. (A research on the economic analysis of greenhouse tomato production in Muğla province). Ege University, Journal of The Faculty of Agriculture, 56 (3):345-358.

[10]Ozdemir, A., 2018, Antalya İlinde Karanfil Yetiştiriciliğinde Maliyet ve Karlılık Analizi. (Cost and Profitability Analysis in Clove Cultivation in Antalya Province), Master thesis, Akdeniz University, Science Institute, Antalya.

[11]Rehber, E., Tipi, T., 2016, Tarımsal İşletmecilik ve Planlama. Ekin Basım Yayın Dağıtım. (Agricultural Management and Planning. Ekin Printing Publishing Distribution),Bursa.

[12]TSI, 2023, Turkish Statistical Institute, <https://biruni.tuik.gov.tr/medas/?kn=92&locale=tr>, Accessed on October 30, 2023.