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ANALYSIS OF COST AND PROFITABILITY FOR ENTERPRISES ENGAGED IN GREENHOUSE CULTIVATION IN HIGHLAND CONDITIONS: THE CASE OF ELMALI, ANTALYA

Talip BAŞBUĞ, Mevlüt GÜL

University of Süleyman Demirel, Agriculture Faculty, Department of Agricultural Economics, 32260 Isparta, Turkey, Phone: +902462118500, Fax:+902462118696, Mobile:+905374876597, Emails: talipbabu@yahoo.com.tr, mevlutgul@yahoo.com

Corresponding author: talipbabu@yahoo.com.tr

Abstract

This study investigates the economic status of the enterprises engaged in greenhouse cultivation activities in Elmalı (Antalya) and examines the contribution of the highland greenhouse production to the regional economic development, thus attempting to generate certain data that would provide guidance to future investors and enterprises that will invest in greenhouse cultivation in highland conditions. The current research was carried out in Gölova, Çukurelma, Salur, Eskisar, Zümrütova, the quarters of Elmalı where greenhouse enterprises are largely concentrated. The data used in the study were collected through questionnaires from 90 greenhouse enterprises designated using the Neyman Stratified Sampling method. The research data belong to 2015 production period. The enterprises engaged in greenhouse cultivation in Elmalı (Antalya) were divided into 3 groups according to the size of their land. According to data obtained in the study, the share of greenhouse production among other business activities of the companies was 52.59%, generating an average income of 44,667 TL (Turkish Liras). The production costs of the enterprises mainly involved seedling costs (18.93%), followed by fertilizer costs (18.00%) and permanent-family labour (14.69%). The mean absolute profit of the enterprises was calculated as 43,602.69 TL. The average unit (1 kg) product cost was calculated as 0.69 TL for enterprises. The mean relative profit rate for enterprises was 1.53. As the greenhouse cultivation period in highland conditions coincides with summer months, the enterprises had no heating costs. Since greenhouse-growing activities increase business potentials and opportunities in the region, they can reduce migration from rural areas to cities. The expansion of greenhouse cultivation could be reached by reducing the unit product cost, as well as by growing appropriate products for domestic and international demand and large-scale investments.

Key words**:** *costs, Elmalı, greenhouse, relative profit, Turkey*

INTRODUCTION

The world population is rapidly increasing day by day. Accordingly, the issues related to food, shelter, access to clean water supplies and provision of other basic living conditions are growing exponentially every passing day. Just as every country is confronted with these issues to varying degrees, Turkey is evidently not immune from such problems [23].

With the increasing consumer needs and technological advances largely influencing agricultural sector, greenhouse production activities and organic farming have become highly important. Therefore, the difficulties in agricultural activities caused by the traditional structure have been gradually overcome, and in terms of production efficiency, the development gap between the agricultural sector and the industrial sector has now begun to close [6].

The term 'greenhouse' refers to any structure covered with light-permeable material, such as glass, plastic etc., to ensure the optimal growing conditions for various crop plants, as well as their seeds, seedlings and saplings, by controlling temperature, relative humidity, radiation, carbondioxide levels and air movement wholly or partly independent of the climatic and environmental conditions[18].

Turkey's vegetable cultivation in greenhouses commenced in Antalya in the 1940s. It followed a rather slow development trend between 1940 and 1960, but once plastic had become a common cover material for greenhouses in the 1970s, the sector experienced a substantial growth [3]. Turkey's greenhouse agriculture showed a

huge development over the years, reaching a total production area of 66,362.1 hectares in 2005. 95% of these greenhouse areas produce vegetables, 4% fruit, and 1% ornamental plants. Greenhouse agriculture has become more widespread in the southern cities of Turkey, with Antalya ranking first among them. The economic value of plant production in Antalya has now reached 270,946,731 USD per year. The amount of fruit and vegetable production in greenhouses has reached 3,192,788 tons per year. The number of enterprises engaged in greenhouse agriculture in Antalya is 17368, with a total greenhouse area of 76,359.2 hectares [25].

If practiced properly in the correct place, the profitability of greenhouse agriculture is quite high when compared to other agricultural practices. Considering the presence of large amounts of fertile soil in Turkey, greenhouse cultivation emerges as one of the most important factors that could reduce the rate of unemployment and (economically motivated) migration from rural to urban areas, as it can produce more yield per unit area, thus increasing the profitability in agricultural activities in rural areas [10].

As for the review of the relevant research in the literature, Özçelik and Aytaç [14], in their study conducted in the central district of Antalya, examined the physical production input in cucumber, pepper, tomato and eggplant cultivation in glass greenhouses. Using the Cobb-Douglas production function, the authors estimated input requirements for products. They found that the statistically significant determinants were the costs of pesticides and hormones in tomato production, pesticide costs in cucumber production, and labour costs in the production of peppers and eggplants. In his research titled "Greenhouse Vegetable Production Economics in Antalya Province", Yılmaz [26] examined socioeconomic structures of enterprises engaged in greenhouse vegetable cultivation in the districts of Kumluca and Gazipaşa, along with the outcome of their business activities. He investigated the greenhouse vegetable production, input use in the activity-area, economic results of the input use, as well as the relationship between the production factors and the yield using Cobb-Douglas production function. According to the research evidence, he determined that there was decreasing returns to scale in his functional analyses conducted in glass and plastic greenhouse vegetable cultivation. He reported that decreasing and increasing certain production factors without changing the scale of the analysed production arms, namely changing the composition of inputs, could improve the yield and net income. Taking into account all the activities in greenhouse vegetable growing, the author concluded that there was inefficient use of capital and labour, with insufficient labour use compared to the capital. Karkacıer and Yılmaz Altuntaş [12] investigated the tomato and cucumber production in greenhouse and outdoor conditions in Tokat through comparative data collected from 109 enterprises. They calculated the gross margin per decare, together with net profit, net output, and net farm income. The highest gross margin was found in greenhouse cucumber production, while the highest net profit was in greenhouse tomato production. Demirkol [6], in his study titled "Product Costing in Greenhouses Corporation as to International Accounting Standards", deals with the identification of common expenses and calculation of production costs in enterprises engaged in greenhouse cultivation. The expenses of such enterprises in the production process were transferred to the expense centers formed, and then these expenses were subjected to distribution and associated with products, so the unit costs were calculated. Adak et al [1], in their study titled "The Rapidly Growing Sector in Recent Years: Highland Greenhouse Cultivation and Elmalı", examined the presence of the greenhouses in Elmalı, comparing highland greenhouse growing to the coastal greenhouse production activities and focusing on the opportunities to develop the highland greenhouse cultivation. In his research "Cost Analysis of Tomato Production in Different Farming Systems", Sipahioğlu [22] attempted to determine the cost-effectiveness of the greenhouses growing tomatoes by means of different cultivation systems in Antalya. In his study, he used data

collected from 67 greenhouses growing tomato by conventional methods and 14 greenhouses growing tomatoes by hydroponic systems. According to the results of the cost analyses, the greenhouses using hydroponic growing method enjoyed better profitability than conventional greenhouses. Özkan et al [15] studied the population structure, land properties, capital structure, and agricultural activity results of the enterprises engaged in greenhouse cultivation in Antalya. The authors calculated the average farm size as 4.82 hectares, finding that the farm capital accounted for 90.08% of the total active capital, with the operational capital representing only 9.92% of it.

This study examines the costs and profitability of the greenhouse cultivation activities in highland conditions, a circumstance resulting from the shift in summer production to highland areas.

MATERIALS AND METHODS

The main material of this research consisted of the data collected through questionnaires from the enterprises engaged in greenhouse production activities in Elmalı (Antalya). The secondary data were obtained from certain institutions and organizations, such as FAO, TUIK (Turkish Statistical Institute), Provincial and District Food, Agriculture and Livestock Directorates. Besides, the findings of relevant national and international studies were also employed. The data used in this study belong to the 2015 production period. Based on the data from the Elmalı office of the Food, Agriculture and Livestock Ministry, the sample size was calculated as 90 enterprises, chosen from the study universe according to the Stratified Sampling Method (Table. 1).

The research data were collected from the enterprises in the study sample, which were engaged in greenhouse cultivation in highland conditions, in face-to-face interviews by using questionnaires. The surveys filled out by the data collected from the 90 enterprises designated by random stratified sampling were carefully reviewed, along with calculations and double-checks, and the socioeconomic data related to the enterprises were then computerized. The analyses regarding the greenhouse cultivation activities involved the calculation of the enterprise size groups, as well as separate mean values for enterprises. The research data were analysed using appropriate statistical software.

Table 1. Sample size

Greenhouse size groups	Greenhouse lower and upper limits (daa)	Population (N)	Average greenhouse size (daa)	Sample (n)
I	1.00-2.99	463	1.76	24
II	3.00-7.59	294	3.86	24
III	7.60 +	55	13.25	42
Total		812	3.30	90

1 decare equal 0.1 hectare
Source: Own calculation.

The economic evaluation of the relevant activity field included the calculations of gross production value, gross profit, absolute profit, relative profit and unit costs. One of the economic results of agricultural activity, Gross Production Value can be defined as the gross income of the whole enterprise or one of the enterprise activities (crop production, animal production, animal husbandry) [9]. Gross profit is the value obtained after deducting the incurred variable expenses associated with production operations from the gross production value [24].

Gross profit = Gross Production Value - Variable Costs

Absolute profit is the difference between operating income and expenditures. The main purpose of a business is to make profit and search for ways to make the highest profit. The difference between gross production value and production expenses is called absolute profit [13].

Absolute profit = Gross Production Value - Production Costs

Relative profit is the proportion of the gross production value to the production expenses, and it explains the proportional superiority of one choice over another. Relative profit is a better way of measuring the yield or return obtained from production activities [13].

Relative Profit = Gross Production Value / Production Costs

Cost is generally defined as all sacrifices incurred in order to gain an advantage or

benefit, or a certain amount of money spent in exchange of a commodity [4]. Cost is also described as the total amount of the expenditures made on production factors utilized in the manufacturing of specific goods or services [2].

RESULTS AND DISCUSSIONS

In the current study, Gross Production Value (GVP), one of the economic results of agricultural activity, was calculated as the sum of the revenues generated by the activities of an enterprise (such as crop production, animal production, animal husbandry) in 2015.

The mean GPV for enterprises was 170,514 TL. In terms of size groups, the highest amount of GVP was in the Group III enterprises at 274,370 TL, followed by the Group II at 94,401 TL and Group I at 64,879 TL.

In the greenhouse size groups, the GVP achieved by greenhouse production ranged from 22,824 to 223,342 TL, while the GVP from fruit production varied between 12,429 and 30,015 TL, vegetable growing 5146-11,646 TL, and animal husbandry 863-11,302 TL. The size groups standing out according to the production branches were as follows: Group III ranks first in greenhouse production with 223,342 TL; Group III in fruit growing with 30,015 TL; Group I in vegetable growing with 11,646 TL; Group III in field crops with 7,666 TL; Group I in animal husbandry with 11,302 TL (Table 2). Greenhouse production activities were the most important activities yielding the highest income in all enterprise groups. Indeed, greenhouse production accounted for 35.18% to 81.40% of the total GPV in size groups. The weighted mean GVP for greenhouse production among the enterprises in the region was 52.59%, in other words, they derived more than half of their annual GPV from greenhouse production activities. Therefore, greenhouse cultivation appears to be an important economic activity for the enterprises examined in the study.

Operation expenses are divided into two groups as fixed and variable costs. Fixed costs are the expenses that are not related to production volume.

Table 2. Distribution of Gross Production Value (GPV) in the Enterprises

Production Branches	Greenhouse size groups I	II	III	Enterprise Average	Weighted mean
	Value (TL/enterprise)				
Greenhouse production activities	22,824	58,525	223,342	125,920	44,667
Fruit growing	12,429	28,227	30,015	24,849	18,853
Vegetable growing	11,646	5,146	6,892	7,694	9,116
Field crops	6,678	1,640	7,666	5,796	4,930
Animal husbandry	11,302	863	6,455	6,256	7,365
Total	64,879	94,401	274,370	170,514	84,932
	Rate (%)				
Greenhouse production activities	35.18	62.00	81.40	73.85	52.59
Fruit growing	19.16	29.90	10.94	14.57	22.20
Vegetable growing	17.95	5.45	2.51	4.51	10.73
Field crops	10.29	1.74	2.79	3.40	5.80
Animal husbandry	17.42	0.91	2.35	3.67	8.67
Total	100.00	100.00	100.00	100.00	100.00

Source: Own calculation.

They will incur whether or not the enterprise is engaged in production of goods or services. The variable costs are the expenses associated with the production volume. These costs will be incurred as long as the enterprise maintains its production activities [21].

In the target area of this study, tomato cultivation ranked first in the greenhouse production, which was followed by cucumbers and small amounts of pepper and eggplant cultivation. The variable cost elements in the greenhouse production of the region mainly included machinery rents, seedlings, fertilizers, pesticides, irrigation, temporary labour costs, bumblebee pollination costs, shipping and marketing, and working capital interest. In the region, the weighted mean of variable expenses for the enterprises was 20,615.21 TL, which accounted for 61.66% of the total production costs.

The fixed costs of the enterprises engaged in greenhouse production mainly included the general administrative expenses, the interest equivalent of bare land value, facility amortization, interest equivalent of facility costs and other fixed expenses. The average fixed costs were 12,803.02 TL, accounting for 38.97% of the total production costs.

In terms of weighted means, the highest variable Seedlings costs were at 6,328.83 TL with a rate of 18.93% in total variable costs. It was followed by fertilizer costs at 6,019.65 TL (18.00%) and Pesticides costs at 4,182.52 TL (12.51%). In terms of weighted means, the fixed cost element that stands out among others was permanent labour costs, which stood at 4,911.71 TL, accounting for 14.69% of the total fixed costs.

Production costs are the sum of the fixed and variable costs. When we analyse these costs according to the enterprise size groups, the average production cost was 22,064.24 TL in Group I, 38,700.22 TL in Group II, and 141,670.84 TL in Group III, while the total production cost of the enterprises was calculated as an average of 82,316.91 TL (Table 3).

Table 3. Production costs in enterprises

Cost elements	Greenhouse size groups			Enterprise Average	Weighted mean
	I	II	III		
	Value (TL/enterprise)				
Seedlings	4,057.68	7,469.79	27,248.87	15,790.13	6,328.83
Fertilizers	3,731.25	7,758.33	22,497.62	13,562.78	6,019.65
Pesticides	3,086.04	4,685.42	14,656.85	8,912.25	4,182.52
Shipping-marketing	1,922.29	1,507.50	4,251.19	2,898.50	1,880.78
Irrigation	297.92	626.25	2,127.38	1,239.22	498.14
Bumblebee pollination	265.42	579.17	2,155.48	1,231.11	463.21
Machinery rents	254.99	397.38	1,339.55	799.09	355.09
Temporary labour costs	185.42	243.33	1,952.55	1,025.52	286.55
Working capital interest	414.03	698.02	2,286.88	1,363.76	600.44
Total variable costs	***14,215.04***	***23,965.18***	***78,516.36***	***46,822.36***	***20,615.21***
Permanent-family labour	3,380.97	4,566.56	27,714.13	15,052.60	4,911.71
Facility amortization	2,365.21	5,676.04	21,521.20	12,187.56	4,416.44
Interest equivalent of facility cost	709.56	1,702.81	6,456.36	3,656.27	1,324.93
Rent of bare land	779.51	1,726.92	5,107.29	3,051.78	1,313.90
General administrative expenses	426.45	718.96	2,355.49	1,404.67	618.46
Miscellaneous costs	187.50	343.75	0.00	141.67	234.57
Total fixed costs	***7,849.20***	***14,735.04***	***63,154.48***	***35,494.55***	***12,820.02***
Production costs	**22,064.24**	**38,700.22**	**141,670.84**	**82,316.91**	**33,435.23**

Source: Own calculation.

The weighted mean value for production costs per unit area was 10,414.16 TL. The mean variable costs in total production costs were calculated as 6,421.08 TL, while the mean fixed costs were 3,993.09 TL. Yılmaz [26], in his study on the greenhouse enterprises in Antalya, found that the enterprises achieved 88.47% of their GPV from greenhouse production activities, with 51.85% of the operating expenses involving variable costs and 45.85% fixed costs.

As for the analysis of production costs per unit area according to enterprise size groups, it was calculated as 11,511.78 TL in Group I, 9,575.31 TL in Group II and 10,303.93 TL in Group III. The analysis of variable costs according to enterprise size groups revealed that seedlings accounted for 18.39% and fertilizer costs 16.91% in Group I, while in Group II the rate of fertilizer costs was 20.05%, seedling costs was 19.30%, pesticide costs was 12.11%. In Group III, the highest variable costs were seedlings (19.23%) and fertilizer costs (15.88%), respectively. On the other hand, the examination of fixed costs according to enterprise size groups showed that the highest costs in Group I were permanent labour (15.32%), facility amortization (10.72%); in Group II facility amortization (14.67%) and permanent labour (11.80%), whereas in Group III the significant fixed cost elements were permanent labour (19.56%) and facility amortization (15.19%).

According to Cantliffe and Vansickle [5], the labour costs represented the largest share (46.99%) of the total production costs in greenhouse tomato cultivation in Spain during the production year of 1997-1998, which was followed by fertilizer costs at 23.1%, pesticides at 8.4% and seed costs at 7.4%. Özkan et al [17] found that variable costs accounted for 48.17% of the average production costs of greenhouse tomato cultivation in Antalya, while fixed costs accounted for 51.83% of total production costs.

Karaman and Yılmaz [11], in their study conducted in the same region, calculated that variable costs represented 45.84% of the total production costs, while fixed costs accounted for 54.16% in the enterprises using bumblebee pollination.

Table 4. Production costs per unit area in enterprises

Cost elements	Greenhouse size groups I	II	III	Enterprise Average	Weighted mean
			Cost (TL / daa)		
Seedlings	2,117.05	1,848.20	1,986.90	1,976.51	1,971.26
Fertilizers	1,946.74	1,919.59	1,640.45	1,697.71	1,874.96
Pesticides	1,610.11	1,159.28	1,068.73	1,115.58	1,302.74
Shipping-marketing	155.43	154.95	155.12	155.12	155.16
Irrigation	1,002.93	372.99	309.98	362.82	585.81
Bumblebee pollination	138.48	143.30	157.17	154.10	144.28
Machinery rents	133.04	98.32	97.68	100.02	110.60
Temporary labour costs	96.74	60.21	142.37	128.37	89.25
Working capital interest	216.02	172.70	166.75	170.71	187.02
Total variable costs	***7,416.54***	***5,929.53***	***5,725.15***	***5,860.94***	***6,421.08***
Permanent-family labour	1,234.02	1,404.38	1,569.25	1,525.56	1,375.60
Facility amortization	1,763.98	1,129.87	2,020.82	1,884.19	1,529.86
Interest equivalent of facility cost	370.21	421.31	470.78	457.67	412.68
Rent of bare land	406.70	427.28	372.41	382.00	409.25
V General administrative expenses	222.50	177.89	171.75	175.83	192.63
Miscellaneous costs	97.83	85.05	0.00	17.73	73.06
Total fixed costs	***4,095.24***	***3,645.78***	***4,605.01***	***4,442.99***	***3,993.09***
Production costs	**11,511.78**	**9,575.31**	**10,330.17**	**10,303.93**	**10,414.16**
			The share in the production costs (%)		
Seedlings	18.39	19.30	19.23	19.18	18.93
Fertilizers	16.91	20.05	15.88	16.48	18.00
Pesticides	13.99	12.11	10.35	10.83	12.51
Shipping-marketing	1.35	1.62	1.50	1.51	1.49
Irrigation	8.71	3.90	3.00	3.52	5.63
Bumblebee pollination	1.20	1.50	1.52	1.50	1.39
Machinery rents	1.16	1.03	0.95	0.97	1.06
Temporary labour costs	0.84	0.63	1.38	1.25	0.86
Working capital interest	1.88	1.80	1.61	1.66	1.80
Total variable costs	64.43	61.93	55.42	56.88	61.66
Permanent-family labour	15.32	11.80	19.56	18.29	14.69
Facility amortization	10.72	14.67	15.19	14.81	13.21
Interest equivalent of facility cost	3.22	4.40	4.56	4.44	3.96
Rent of bare land	3.53	4.46	3.61	3.71	3.93
General administrative expenses	1.93	1.86	1.66	1.71	1.85
Miscellaneous costs	0.85	0.89	0.00	0.17	0.70
Total fixed costs	35.57	38.07	44.58	43.12	38.34
Production costs	100.00	100.00	100.00	100.00	100.00

* Statistically significant.
Source: Own calculation.

They also found that, in the enterprises not using bumblebee pollination, 41.76% of total production costs was variable costs and 56.43% fixed costs. Rad and Yarşı [20] reported that, for the enterprises engaged in greenhouse tomato production in Mersin during autumn, pesticide costs represented the highest share (8.86%) of total production costs, which was followed by temporary labour wages (8.22%), seedling costs (7.85%), chemical fertilizers and plastic cover costs (5.15%) and farm manure costs (5.04%).

In his study on a greenhouse enterprise growing tomatoes in Romania in 2002, Popescu [19] calculated that material expenses accounted for 47.4% of the total production costs, reporting that the cost of a kilo of tomatoes was 0.402 USD, with a sales price of 0.454 USD. He also determined that the profit derived from one hectare of production was 4,815 USD. Hood et al [8], in their study examining the greenhouse tomato cultivation in Mississippi, determined that the pesticide costs represented a share of 6.98% of the total production costs during autumn and 7.65% during spring. Estes and Peet [7], in their study on North Carolina greenhouse production during spring, reported that the seedling costs accounted for 4% of gross production value (GPV), maintenance costs 14% and harvesting costs 10%, while the greenhouse facility costs represented a share of 15%. The authors reported that production costs comprised 87% of gross value of production.

In our study, the weighted mean of gross profit was calculated as 24,052.50 TL per enterprise, 7,491.60 TL per decare, while the absolute profit was 11,232.19 TL per enterprise and 3,498.52 TL per decare, with a relative profit ratio of 1.34 and a unit product cost of 0.73 TL.

Sipahioğlu [22], in his study carried out in Antalya, found that the cost of tomato production in conventional greenhouses was 15,810.49 TL per decare and 1.01 TL per kilogram. The author calculated that, considering the GPV achieved by the yield in conventional greenhouse tomato production, the grower's net profit was 3,208.8 TL per decare, while the gross profit was 7,010.11

TL. Our findings regarding the net profit and gross profit per decare coincide with the results reported by Sipahioğlu [22].

In their study examining the greenhouse tomato production in the central district of Antalya, as well as Serik and Kumluca, Özkan et al [16] calculated the average net profit and gross profit per unit area for enterprises as 1,733.59 TL and 5,568.37 TL respectively. They also reported that double-period tomato cultivation generated an average gross profit of 8,993.65 TL, which was higher than the single period of cultivation (7,773.69 TL); the analysis of data according to greenhouse types revealed that the highest gross profit (9,484.93 TL) and net profit (4,442.80 TL) in glass greenhouses were derived from winter production cycle, whereas the highest gross profit (TL 4,507.07) and net profit (1,266.36 TL) in plastic greenhouses were made during summer production. When they compared the gross and net profitability of plastic and glass greenhouses, they found that glass greenhouses afforded better profitability than that of plastic greenhouses. In our study sample, the growers reported that financial reasons were determinant factors in their preference of plastic greenhouses, as they were directly associated with profits and costs.

Based on the analysis of our research data, we found that the relative profit ratio was 1.03 in Group I, 1.51 in Group II, and 1.58 in Group III, with an enterprise average of 1.53 and a weighted mean of 1.34.

Table 5. Profitability indicators and unit costs in enterprises

Cost elements	Greenhouse size groups			Enterprise Average	Weighted mean
	I	II	III		
	Cost (TL / daa)				
Gross profit (TL/enterprise)	8,609.13	34,559.82	144,826.12	79,097.24	24,052.20
Gross profit (TL/daa)	4,491.72	8,550.88	10,560.24	9,900.91	7,491.60
Absolute profit (TL/enterprise)	759.92	19,824.78	81,671.64	43,602.69	11,232.19
Absolute profit (TL/daa)	396.48	4,905.10	5,955.22	5,457.92	3,498.52
Relative profit	1.03	1.51	1.58	1.53	1.34
Unit product cost (1 kg)	0.90	0.64	0.68	0.69	0.73

Source: Own calculation.

The unit (1 kg) product cost was calculated as 0.90 TL in Group I enterprises, 0.64 TL in Group II, and 0.68 TL in Group III, with an enterprise average of 0.69 TL and a weighted mean standing at 0.73 TL. As the greenhouse area increases, so does the rate of relative profit. This value was found to be statistically significant. The increased greenhouse area was also found to reduce the unit product cost. Therefore, expanding the scale of greenhouses in the region might improve profitability.

CONCLUSIONS

Based on the findings achieved in this study, where we examined the cost and profitability of greenhouse cultivation in highland conditions, we conclude that large-scale enterprises yield better results in terms of economic indicators.

Greenhouse cultivation is a relatively new practice in the region as it first began only in 2000s, and it is becoming a widespread production method day by day.

The overall profitability of the enterprises covered in the study was satisfactory, and this high profitability leads to the expansion of greenhouse agriculture in the region.

In conclusion, the practice of greenhouse cultivation in the region is of vital importance, as it promotes effective use of regional sources, increases the income of people in the region, and creates employment, thus reducing migration from rural areas.

Besides, it is also an important agricultural activity in that it ensures the continuity of supply for the consumer demand in the vegetable sector.

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