Input usage and cost analysis in capia pepper production: Canakkale Province, Turkey sample

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Abstract

This research was carried out in Çanakkale, where the most capia pepper production is carried out in Turkey. The main purpose of the research is to analyse the production of capia pepper economically in the light of agricultural business science. The original data used in the research were obtained by applying a questionnaire from 76 agricultural enterprises determined by the "stratified sampling method". According to the results of the research, the average age of business owners is 43.57 years, and the household size is 3.72 people in the enterprises examined. The professional experience of the producers in capia pepper production was found to be 17.78 years. Capia pepper production activity ranks first with a share of 34% in the herbal production pattern and 47% in the vegetable production value of the enterprises examined. It has been determined that the average capia pepper production area per farm was 15.48 da, and the yield was 3094.57 kg da^{-1}. In order to reach the average yield in one decare area in capia pepper production; 4454 seedlings, 44.51 kg of pure fertilizer, 485 ml of agricultural pesticides, 3.26 hours of machine pulling power, 19 lt of diesel fuel and 100 hours of manpower are needed. In order to gain an income of 2936₺ capia pepper from unit area in enterprises in terms of monetary size; seedlings worth 1943₺, pure fertilizers worth 253₺, agricultural pesticides worth 105₺, machine drawing power worth 382₺, diesel fuel worth 2312₺ and human labour worth 1387₺ are needed. The average sales price of capia pepper was determined as 0.99₺ kg^{-1} in the enterprises surveyed, and the highest average sales price was found as 1.19₺ kg^{-1} in the enterprises in the second group. Considering the average of enterprises; capia pepper production cost in per area was calculated as 5399.95₺ da^{-1}, production value as 3063.62₺ da^{-1} and gross profit as -1934.92₺ da^{-1}. The results obtained in the research showed that capia pepper production in the research area was not profitable in 2020. Likewise, the sale price of capia pepper in 2020 was at the lowest level of recent years, and this had a negative impact on the product income. In order for the capia pepper production to be profitable in the examined enterprises, it is of great significance that the agricultural unions or cooperatives establish cold storage in the region and that the producer unions or cooperatives should make their presence felt during the marketing phase of the product. To create such a structure is seen as a significant phenomenon that can ensure price stability in the product.

Keywords: Capia Pepper. Input Usage. Gross Profit. Production Cost. Turkey.

1. Introduction

A significant part of the agricultural production consists of fresh fruits and vegetables. Turkey has suitable soils, ecology and climatic conditions for the production of great a many fruits and vegetables. Especially for pepper, Turkey has a greater variety of pepper types (charliston, bell peppers, local peppers for drying, pointed peppers for table, capia (for oil), pickled peppers and ornamental peppers, etc.) compared to other countries. In addition to these, peppers such as Greek charlis, jalapeno, Hungarian pepper, block peppers, Chile peppers are also cultivated in the country, although their production is not widespread. In recent years, greenhouse cultivation of peppers in types of jalapeno, California Wonder, Chili, Greek charlisi, Hungarian stuffed peppers has become widespread (UIB, 2017).

Capia pepper (Capsicum annum. *L. var. conoides (Mill.*) *ırısh*) *i*s a cultivated plant among the *Capsicum* species in the *Solanaceae* family. Pepper is a very important vegetable in terms of the vitamins and rich minerals it contains and is consumed willingly both in the world and in Turkey. Pepper has reached a great export and import potential both in terms of aquaculture and industry throughout the world (Şahiner, 2019). While capia pepper was largely produced for tomato paste in previous years, its usage areas have increased considerably in recent years. It is also consumed in cold appetizer products, canned roasted peppers, pickles, sauces and frozen products (Özdikmenli and Zorba, 2015).

According to the data of the United Nations Food and Agriculture Organization (FAO) on fresh peppers (Chillies and peppers, green) with the product code (Item Code) 401, the world's total pepper production area was 19909260 in 2019 and the production amount was 38027164 tons (FAO, 2021). According to the data of the Turkish Statistical Institute (TUIK) for the year 2020, the pepper cultivation area in Turkey was 777862 decares and the production amount was 2636905 tons. Out of the total pepper production area in Turkey, Capia pepper holds an average of 47.57% (370031 decares) and capia pepper production constitutes 48.96% of the country's total pepper production amount (TUIK, 2021).

When the capia pepper production data in Çanakkale, which is determined as the research area of the Turkish Statistical Institute, is examined, it is understood that 266679 tons of products were obtained from an area of 71755 decares. In the provincial capia pepper production areas, Yenice district has a share of 62.52%, Biga district 13.38% and Bayramiç district 8.50% (TUIK, 2021).

In this study; pepper production areas, production amounts and yield values in the world and in Turkey were examined, and pepper trade in the world and in Turkey was also included. Within the study, the general structure of the enterprises producing capia pepper in

Bayramiç, Biga and Yenice districts, which constitute 81.37% of the capia pepper production in Çanakkale, was presented, and also the use of inputs and product costs in capia pepper production were examined on the basis of business sizes. The findings obtained in the research have been analysed and interpreted correlatively with other research findings on a world scale on the basis of the subject.

2. Literature Review

In this section, some of the significant studies on input use and production cost in capia pepper are briefly mentioned. within the relevant sections of the study, comparison and analysis of the findings obtained from this research with other research results are given in detail.

Dipeolu and Akinbode (2008), in their own studies, examined technical, distribution and economic activities in pepper production in Southwest Nigeria. Considering the current efficiency levels, the values obtained in the study have shown that it is possible to increase pepper yield and reduce costs without the need to change existing technology.

The study of Pozderec et al. (2010) is based on an economic analysis of pepper and cucumber production in Slovenia. As a result of the study, it was determined that it is more profitable to grow pepper and cucumber in protected area than in open fields.

In the study carried out by Candemir et al. (2012) in Turkey, four different production systems (crops) were examined in order to determine the production systems that can be used economically in organic red pepper production. As a result of the study, it was determined that the highest gross profit was in the production system consisting of red pepper, beans and cotton.

Within a study by Sanusi and Ayinde (2013) in Nigeria's Ogun State, the profitability of pepper production has been investigated. The data of the study is based on primary data collected from 120 pepper farmers. As a result of the study, it has been determined that pepper production is a profitable field of activity.

Baba et al. (2014) conducted a study in order to examine the comparative profitability of watermelon and pepper production in Danko-Wasagu Local Government Area of Kebbi State, Nigeria. Recent study showed that watermelon and pepper production is profitable, however watermelon is more profitable than pepper. The rate of return on investment (ROI) per hectare was calculated as 55.1% and 45.3% for watermelon and pepper, respectively. In

the study; It was also concluded that adequate security measures and rapid pest and disease control measures will increase the overall efficiency of both watermelon and pepper production, and this will result in higher incomes for farmers.

In the study conducted by Başaran and Engindeniz (2014) in Turkey, it was aimed to analyse the economic analysis of green pepper production. Data obtained from 59 producers in respect of the 2013 production period were used in the study. According to the results of the study; The average pepper yield per farm was determined as 3003.39 kg da^{-1} and the pepper production area was determined as 26.83 da. In the research; The average cost of pepper production per enterprise in the examined enterprises was determined as 1624.35₺ da^{-1}, variable costs 1338.42₺ da^{-1}, gross profit 637.85₺ da^{-1}, and net profit 387.92₺ da^{-1}.

Another study carried by Ayodele et al. (2016) aimed at clarifying the economic potential of pepper product in small-scale enterprises. The research was carried out with 60 pepper producers determined according to the Random Sampling Method in order to designate the Benefit / Cost ratio in pepper production. Barriers to optimum efficiency and profitability in the enterprises examined in the study were defined as; Inadequate capital, labour shortage, lack of extension services, especially the inability to obtain fertilizers when requested and the lack of advanced planting materials.

The study by Dessie et al. (2017) in Southern Ethiopia's Abeshge Region and Guragie Region aimed at analysing the factors that determine the value chain and market supply of red pepper. The study particularly focused on the market channel of pepper, market participants and the performance of red pepper markets, and analysed the main determinants of red pepper supply within the scope of the research. Data were obtained through focus group discussions. In the study, it was emphasized that traders received 61.3% of the profit margin of red pepper.

In the study by Ali et al. (2018) , it was aimed to analyse the productivity in red pepper and bell pepper production in the Punjab province of Pakistan. In the study; It has been concluded that the same production rate could be achieved by reducing 21.2% in inputs and 43.4% in total costs. The lowest technical efficiency (40.8%), allocation efficiency (17.2%) and economic efficiency (17.2%) were calculated within the study.

In the research carried out by Yıldız (2019) in Çanakkale, one of the significant places where capia pepper is grown in Turkey, the problem of weeds in enterprises producing capia pepper was investigated. The study has revealed that capia pepper growers are not satisfied with the income they have obtained from this product, and that the most notable issue in the production phase (seedling and flowering periods) is the fight against weeds.

In the research conducted by Akkaya (2020) in Turkey, it has been found out that the production costs of organic and conventional (traditional) peppers are close to each other. The product cost was calculated as 3381.7₺ da^{-1} in organic pepper production and 3794.7₺ da^{-1} in conventional green pepper production. In the study; The profit obtained by the producers producing conventional chilli peppers is 1245.2₺ da^{-1} per decare, and this value has been calculated as 1983.3₺ da^{-1} for organic chilli pepper production.

3. Materials and Methods

3.1. Materials

The primary data of the research consists of the data obtained from 76 agricultural enterprises that produce capia pepper in Biga, Bayramiç and Yenice districts of Çanakkale province in the Marmara Region of Turkey and determined according to the Stratified Sampling Method.

In the study; Data from the World Food and Agriculture Organization (FAO), Ministry of Agriculture and Forestry (TOB), Turkish Statistical Institute (TUIK), Çanakkale Provincial Directorate of Agriculture and Forestry were referred as secondary data. Pepper production area of the world, Turkey and Çanakkale province, production amount, pepper import and export data are also included within the scope of the study.

3.2. Methods

3.2.1. Method used in sampling

In order to determine the number of surveys which will be applied in the research, the statistical formula proposed by Neyman, one of the Stratified Sampling Methods, has been used for the purposes of ensuring homogeneity among enterprises (Yamane, 1967).

$$n = \frac{[\Sigma(Nh * Sh)]^2}{N^2 * D^2 + [\Sigma(Nh * Sh)]^2} \quad (1)$$

$$D^2 = (d/t)^2 \quad (1.1)$$

n = Sample Volume

Nh = number of enterprises in the sampling frame belonging to the h'th layer

Sh= standard deviation of data in layer h'th

Sh^2= variance of data in layer h'th

t= table value of t for a certain confidence interval

N= Total Number of Businesses per Sampling Frame

d= It represents a certain % deviation from the mean.

The following formula was used to distribute the sample volume to the layers.

$$n = [(Nh * Sh) * n] / \Sigma(Nh * Sh) \quad (1.2.)$$

Data from Çanakkale Provincial Directorate of Agriculture and Forestry Farmers Registration System (FRS) were used to determine the number of enterprises to be included in the sample. For this purpose, the data of the FRS of the year 2019 were used. Within the framework of the sampling created for the scope of the research, a survey was conducted in 76 enterprises determined with 99% confidence interval and 5% deviation from the mean.

Within the scope of the research 76 questionnaires were applied. In the enterprises surveyed, there are 21 producers in the first group, 20 producers in the second group and 35 producers in the third group. Considering the enterprises that make up the sample volume, the standard deviation and coefficients of variation; Capia pepper is divided into 3 groups according to its production area: 2.00-4.99 decares, 5.00 -9.99 decares, and 10 decares and above.

3.2.2. The method used in determining the cost of capia pepper

In the preparation of the cost chart of Capia Pepper, the charts used by the Çanakkale Provincial Directorate of the Ministry of Agriculture and Forestry and the cost charts used in various researches on the subject were taken into consideration. In the research, the cost of Capia Pepper was calculated according to the method below (Alemdar, 2014).

Gross Production Value (GPV): Main Product [Product Yield (kg da^{-1}) * Product Sales Price (₺ kg^{-1})

In this study, the production value of capia pepper was taken into account.

Veriable Expenses: Soil Cultivation + Sowing and Seed + Fertilizer and Fertilization + Pesticide and Spraying + Harvest and Transport costs.

Constant (Fixed) Expenses: Land Rent (*) + Capital Interest (**) + Management Expense (***) all form the overall expenses.

(*): *The rental value of the areas rented by the business owners in capia pepper production or the rental values of their own lands according to the alternative cost principle are taken into consideration.*
(**) *Capital Interest: Changing Expenses * 4.5%*
(***) *Management Expenses: Total Costs * 3%*

Total Expenses: Veriable Expenses + Constant Expenses

Gross Profit: Gross Production Value (GPV) – Veriable Expenses

Net Profit: GPV - (Veriable Expenses + Constant Expenses)

The cost findings obtained as a result of the research are given in Turkish Lira (₺). According to the data of the Central Bank of Turkey, the US Dollar ($) / Turkish Lira (₺) parity for 2020 has been taken into account as 7.43 (CBRT, 2021). With the help of this value, research findings can be converted into other countries' currencies.

4. Pepper Production and Foreign Trade

4.1. Pepper production and trade in the world and in Turkey

According to the 2019 FAO data, the world pepper production area was determined as 19909260 da, the production amount was 38027164 tons and the yield value was 1910 kg da^{-1}. Turkey ranks third in the world with 2625669 tons of pepper production in 2019. World total pepper import is 914918 tons with a value of $2046059000. World pepper export amount increased to 937065 tons and its value was $2141537000 in 2019 (FAO,2021).

According to the data of the Turkish Statistical Institute (TUIK) for the year 2020, the total pepper production area in Turkey was 777.862 decares, the production amount was 2636905 tons, and the yield value was at the level of 3389.94 kg da^{-1}. According to 2020 data, capia pepper for tomato paste constitutes 47.57% of the total pepper production area and 48.96% of the production amount in Turkey.

As of 2019, Turkey made an import of $487000 with 220 tons and export of $124189000 with 109975 tons (FAO, 2021). When the data on the 'Pepper Balance Tables' in the Crop Production Balance Tables published by the Turkish Statistical Institute (TUIK) are examined, it is understood that while the proficiency level in pepper for Turkey was 109.2% in 2015, this rate was 110% in 2020. The degree of adequacy in pepper production varied

between 108.9% and 110% between years of 2015 and 2019. These values show that Turkey adequately meets its pepper demand with local supply.

4.2. Pepper production and trade in Çanakkale Province

In the province of Çanakkale, which is determined as the research area, the total production area of bell pepper, pointed (chilli), green pepper and pepper for paste is 80381 decares and the production amount is 284072 tons in the production period of 2020. It is understood that Çanakkale province ranks as the first province in Turkey in terms of both production area and production amount for capia pepper in the period between 2016-2020. Likewise, according to the 2020 production statistics (TÜİK, 2021) Çanakkale province constitutes 19.39% of the capia pepper production areas and 20.66% of the production amount in Turkey. According to the data of the same year, the yield value of capia pepper in the country was 3489.10 kg da^{-1}, while this value was found to be at the level of 3716.50 kg da^{-1} throughout the province.

The production value of capia pepper produced in Çanakkale in the production period of 2020 was seen as 292571290₺ (Table 21). It is understood that the production value of pepper (pointed and charliston) is 37353605₺. The share of pepper (for paste, pointed, green pepper and stuffed peppers) is 5.08%, and the share of tomato paste (capia) is 4.36% in Çanakkale's total plant production (6708289665₺). The share of pepper (for paste, pointed, green pepper and stuffed peppers) in the vegetable production value of the province (1344418325₺) is 25.33%, and the share of paste (capia) pepper is 21.76% (TOB, 2021).

A significant part of Çanakkale province's export products consist of canned products, fresh fruits and vegetables (predominantly capia pepper), frozen fruits and vegetables. Among the two product groups that make up the export potential, the most important raw material source is capia pepper, which is widely produced in Çanakkale.

5. Results and Discussion

5.1. Household characteristics of the examined enterprises

It has been determined that the total number of people living in the households in the surveyed enterprises was 283, and the average of people living in the households was 3.72. On the other hand, the average age of business owners was determined as 43.57 years, and their professional experience in capia pepper production was found to be as 17.78 years. When the educational status of the households living in the surveyed enterprises is examined,

it was determined that the rate of those who graduated from primary school was 37.81%, the rate of those who graduated from primary school was 26.15%, and the rate of those who graduated from high school was 20.85%. The average Male Labor Unit (MLU) in the surveyed enterprises is 2.85.

The recent research revealed that capia pepper production is carried out on 212 parcels, an average of 2.79 parcels per enterprise, and a capia pepper production area per parcel is found as 5.55 decares. According to the results of the study conducted by Başaran and Engindeniz (2014) on the enterprises engaged in open pepper cultivation in Torbalı District of İzmir; it was found out that the average number of parcels in the pepper lands was1.58, and the average parcel size was 16.98 decares.

The average yield value in capia pepper production in Çanakkale in the production period of 2020 is 3707 kg da^{-1}, and the yield of capia pepper in Turkey is 3489 kg da^{-1} (TOB, 2021; TUIK, 2021). It was determined that while the capia pepper yield of the enterprises in the first and second groups in the examined enterprises was above the average yield of Turkey, the average yield of the enterprises in the third group was below the yield level of Turkey and Çanakkale. It was confirmed that while the total capia pepper production area of 21 enterprises in the first group was 75.4 decares, the total production area of the enterprises in the third group was 943.5 decares. Examining the production amount it was determined that 274100 kg of capia was produced in the first group, 2785400 kg of product was obtained in the third group, and the total production was 3642000 kg (Table 1).

Table 1: Data on capia pepper production in enterprises

Business Size Groups	Area (da)	Production (kg)	Yield (kg da^{-1})
1	75.40	274100	3635,28
2	158	582500	3686.71
3	943.50	2785400	2952,20
Total	1176.90	3642000	3094.57

According to the results of the study conducted by Başaran and Engindeniz (2014) on the enterprises engaged in open field pepper cultivation in Torbalı District of İzmir, the yield value obtained from the unit area varies between 2-4 tons. According to TUIK's 2013 data, the yield of chilli pepper per decare in Turkey is 2269 kg da^{-1}. In the study, it was determined that the lowest yield was 1500 kg da^{-1}, the highest yield was 6000 kg da^{-1}, while the average yield was 3094.57 kg da^{-1} (Table 1).

5.2. Vegetative production activities of enterprises

Since the surveyed enterprises include capia pepper production as well as animal husbandry activities, such as wheat (green grass), corn (silage), barley (green grass), oats, alfalfa, fodder peas and Italian grass, in order to meet the roughage need in the enterprise, it was seen that forage crops were also produced. It was determined that the total plant production area in the enterprises examined in the study was as 3488.15 decares (Table 3). When the total plant production area and ratio of the study are examined, it is seen that in 33.74% of the total plant production area, capia pepper production ranks first, corn (silage) production comes second with 26.38%, and wheat (green grass) production with a rate of 8.39% took the third place (Table 2).

Table 2: Plant production pattern of the examined enterprises

Products	Layer 1		Layer 2		Layer 3		Total	
	Production Area (da)	Share (%)	Production Area (da)	Share (%)	Production Area (da)	Share (%)	Production Area (da)	Share (%)
Capia Pepper	75.4	15.21	158	15.28	943.5	48.17	1176,90	33.74
Wheat (Green Grass)	84.5	17.05	104	10.06	104	5.31	292.5	8.39
Wheat (Grain)	0	0.00	51	4.93	120	6.13	171	4.90
Corn (Silage)	164	33.09	321	31.04	435	22.21	920	26.38
Barley (Grain)	3	0.61	50	4.84	0	0.00	53	1.52
Barley (Green Grass)	17.5	3.53	59	5.71	112	5.72	188.5	5.40
Oat	15	3.03	15	1.45	28	1.43	58	1.66
Clover	12	2.42	26	2.51	40	2.04	78	2.24
Tomato	35.25	7.11	5	0.48	59	3.01	99.25	2.85
Green beans	0	0.00	0	0.00	10	0.51	10	0.29
Field Peas	16	3.23	158	15.28	86	4.39	260	7.45
Watermelon	5	1.01	0	0.00	10	0.51	15	0.43
Corn (Grain)	0	0.00	55	5.32	0	0.00	55	1.58
Paddy	28	5.65	0	0.00	0	0.00	28	0.80
Oily Sunflower	20	4.04	0	0.00	0	0.00	20	0.57
Italian Ryegrass	0	0.00	32	3.09	11	0.56	43	1.23
Pepper (Charliston) / Banana Pepper	10	2.02	0	0.00	0	0.00	10	0.29
Fallow	10	2.02	0	0.00	0	0.00	10	0.29

Total	495.65	100.00	1.034,00	100.00	1.958,50	100.00	3488.15	100.00

Considering the the plant production value of 76 enterprises examined in the study, total production value was determined as 6684590₺ 47.45% of this amount belongs to capia pepper production. It is found out that sweet corn (for silage) with a value of 1987500₺ and with a ratio of 29.73% and tomato with a value of 498400₺ and rate of 7.46%, respectively follow the capia pepper (Table 3).

Table 3: Vegetative production values

Products	Layer 1		Layer 2		Layer 3		Total	
	Production Value (₺)	Share (%)	Production Value (₺)	Share (%)	Production Value (₺)	Share (%)	Production Value (₺)	Share (%)
Capia Pepper	261140	27.28	670570	48.52	2240097	51.55	3.171807	47.45
Green Wheat	40900	4.27	55800	4.04	55880	1.29	152.580	2.28
Wheat (Grain)	0	0.00	46400	3.36	137592	3.17	183.992	2.75
Corn (Silage)	395550	41.32	376550	27.25	1215400	27.97	1987500	29.73
Barley (Grain)	1980	0.21	35640	2.58	0	0.00	37.620	0.56
Barley (Green Grass)	8820	0.92	28845	2.09	54576	1.26	92.241	1.38
Oat	13200	1.38	11550	0.84	23155	0.53	47.905	0.72
Clover	16920	1.77	24300	1.76	35415	0.82	76.635	1.15
Tomato	12400	1.30	15700	1.14	470300	10.82	498.400	7.46
Green beans	0	0.00	0	0.00	54450	1.25	54.450	0.81
Field Peas	0	0.00	0	0.00	0	0.00	0	0.00
Watermelon	17440	1.82	0	0.00	50000	1.15	67440	1.01
Corn (Grain)	0	0.00	85020	6.15	0	0.00	85.020	1.27
Paddy	114240	11.93	0	0.00	0	0.00	114240	1.71
Oily Sunflower	14800	1.55	0	0.00	0	0.00	14800	0.22
Italian Ryegrass	0	0.00	31560	2.28	8400	0.19	39960	0.60
Pepper (Charliston) / Banana Pepper	60000	6.27	0	0.00	0	0.00	60000	0.90
Total	957390	100.00	1381935	100.00	4345265	100.00	6684590	100.00

In their study to determine the physical production inputs, cost and profitability used in the production of Maraş pepper, Aytop and Akbay (2018) determined that the average yield value is 1558.01 kg da^{-1} in an average area of 40.88 decares per farm. In this study, however, it is defined the capia pepper production was carried out on an area of 1176.9 decares and the average yield was 3094.57 kg da^{-1}.

The research revealed that 94.74% of the surveyed enterprises did not have soil analysis and 76.32% did not have agricultural insurance.

5.3. Production value of capia pepper production of enterprises

Taking enterprises into consideration in general, the average selling price of capia pepper was determined as 0.99₺ kg^{-1} (Table 41). In a study based on the economic analysis of pepper and cucumber production in open field and protected area in Slovenia, Pozderec et al (2010) determined that the selling price of the pepper grown in the protected area was 0.80 € kg^{-1} (1.57₺ kg^{-1}), while the pepper grown outside was 0.70 €. kg^{-1} (1.37₺ kg^{-1}).

The production value information obtained by the surveyed enterprises as a result of their activities for capia pepper production is shown in Table 4. Yield and product sales price are effective on the production value obtained from the unit area.

Table 1 Capia pepper production value information

Layers	Production Area (da)	Production Quantity (kg)	Yield (kg da^{-1})	Production Value (₺)
1	75.4	274100	3635.28	261140
2	158.0	582500	3686.71	670570
3	943.5	2785400	2952.20	2240097
Total	1176.9	3642000	3094.57	3171807

In the research area, it was determined that the average production value of capia pepper per enterprise was 41734₺, and the average production value obtained from the unit area was 2695.05₺ da^{-1}.

5.4. Input usage and cost in capia pepper production

The average input usage values related to capia pepper production in the surveyed enterprises are shown in Table 5 in detail. When the average input amounts used by the enterprises in capia pepper production per unit area are examined, it has been determined that 8.78 lt da^{-1} of diesel is consumed for soil tillage operations, 1039.11 min^{-1} human labor is used, 59.38 min^{-1} machine drawing power is used.

Table 5: Input usage values in capia pepper production

Production Operations	Processing Time	Number of Transactions	Work power (min. da $^{-1}$)		Material (kg-gr-piece-ml-lt da^{-}1)	Type	Explanation
			Human	Machine			
(A) Soil Cultivation and Planting			Average	Average	Average		
Deep ploughing	November-April	2-3	27.46	27.46	4.09	diesel (lt da^{-}1)	Plow
Double harrowing	March - April	1-2	9.36	9.36	1.69	diesel (lt da^{-}1)	Cultivator/Crowbar
Harrowing	April	1-2	13.97	13.97	1.82	diesel (lt da^{-1})	Harrow / Rake
Furrowing	April	1	8.59	8.59	1.18	diesel (lt da^{-1})	Furrow Plow/Frow Chisel
Planting Work (by hand)	May	1	979.73			diesel (lt da^{-1})	da^{-}1 per minute with 1 worker
Total			**1039.11**	**59.38**	**8.78**		**Da**
(B)Maintenance Works							
Fertilizing Work	April-July	4-5	110.96			workforce (min da $^{-1}$)	Manual/Drip Irrigation
Fertilizer Machine	May	1-2	10.01	10.01	0.52	diesel (lt da^{-1})	Fertilizer Spreader
Hoeing by hand	May-July	2-3	1426.58	0	0	workforce (da $^{-1}$ per hour)	with 1 worker at 1426,58 min da $^{-1}$
Hoeing Machine	May June	1-2	32	32	2.31	diesel (lt da^{-1})	Tractor or self-propelled tiller
Spraying (Herbicide)	May June	1	10.04	10.04	0.56	diesel (lt da^{-1})	Pulverizator
Spraying Work	June-August	3-4	86.45	0	0	workforce (min da $^{-1}$)	1 worker in 86.45 minutes^{-1}
Irrigation Work	May-September	10-11	151.89	0	0	workforce (min da $^{-1}$)	1 worker per 151.89 min^{-1}
Irrigation Facility Installation and Dismantling Labour	May-October	2	94.26	0	0	workforce (min da $^{-1}$)	1 worker in 94.26 minutes^{-1}
Total			**1922.19**	**52.05**	**3.39**		da^{-1}
(C) Harvest							
Harvest Work	September	4-5	2575.26			workforce	2575.26 minutes per

	October					(da $^{-1}$ per hour)	minute with 1 worker (Manually)
Sorting-Sacking-Loading Work	September October	4-5	299.21			workforce (da $^{-1}$ per hour)	299.21 minutes per 1 worker da $^{-1}$
Unloading Work	September October	4-5	99.47			workforce (da $^{-1}$ per hour)	1 worker per 99.47 min da $^{-1}$
Transport	August.-October	4-5	64.34	64.34	2.18	diesel (lt da^{-1})	da^{-1}
Total			**3038.28**	**64.34**	**2.18**		
(V) Various Inputs							
Seedling	May	1			4477.63	per piece da^{-1}	piece/da
Farm Manure Shipping	November	1	69.23	69.23	1.76	diesel (lt da^{-1})	da^{-1}
Energy Use in Irrigation	April- July	10-11			28.97	diesel (lt da^{-1})	da^{-1}
Packaging	July November	1			104.8	per piece da^{-1}	Piece/Sack
Total			**69.29**	**69.29**	**4613.16**		da^{-1}
Chemical Fertilizers							
Base Fertilizer (pure)	April	1			20.97	kg da^{-1}	da^{-1}
2. fertilization (pure)	May-June-July	1			7.12	kg da^{-1}	da^{-1}
3. fertilization (pure)	May-June-July	1			5.54	kg da^{-1}	da^{-1}
4. Fertilization (pure)	May-June-July	1			11.29	kg da^{-1}	da^{-1}
5.Humic Acid	May-June-July	1			3.03	lt da^{-1}	da^{-1}
6. Farm Manure	November December				2484.38	kg da^{-1}	da^{-1}
Total					2532.33	lt-kg da^{-1}	da^{-1}
Pesticides							
Agricultural herbicide chem. (fung.)	May-June-July	1			294.74	ml da^{-1}	da^{-1}
Agricultural	May-June-	1			100.15	ml da^{-1}	da^{-1}

herbicide chem. (herb.-	July				
Agricultural herbicide chem. (ins.)	May-June-July	1	114.38	ml da^{-1}	da^{-1}
Total			**509.27**	ml da^{-1}	da^{-1}

However, it is determined that in the study; 3.39 lt da^{-1} of diesel is spent for maintenance operations, 1922.19 min^{-1} of human labour, 52.05 min of machine towing power, 2575.26 min^{-1} of human labour is used for picking work. It is understood that the most labour use has been in the harvesting processes. Examining the various input it has been determined that an average of 4477.63 seedlings are used per decare, and human labour and machine draft power are used per 69.29 minutes da^{-1}. Diesel use was determined as 30.73 lt da^{-1}. Considering the use of chemical fertilizers, it was calculated that 44.92 kg da^{-1} of pure manure and 2484.38 kg da^{-1} of farm manure were used. As for the use of pesticides, it was determined that the enterprises used fungicides, herbicides and insecticides, and it was determined that the total use of pesticides was 509.27 ml da^{-1}.

According to the study of Aytop and Akbay (2018) on Maraş pepper in Gaziantep, Kahramanmaraş and Kilis provinces, an average of 8.63 hours of machine drawing power is used in the production of Maraş pepper. While the average drawing power used in the production of Maraş pepper in Gaziantep and Kahramanmaraş provinces is 8.68 da^{-1} hours, this value is 8.55 da^{-1} hours in Kilis. It has been determined that the maximum machine drawing power in Maraş pepper production is 53.65% in maintenance operations and 32.79% in soil preparation, respectively. When the evaluation is carried out on the basis of provinces in the research; it has been determined that maximum machine drawing power in soil preparation is used in Kilis (33.33%) and Kahramanmaraş (32.49%), and the least in Gaziantep (32.14%), respectively; As for the maintenance operations, it has been determined that the maximum machine drawing power is used in Kahramanmaraş (55.18%) and Gaziantep (54.03%), and the least in Kilis (52.98%). In this study, however, it has been determined that the average machine drawing power usage in a decare area is 245 minutes.

In a study by Ali et al. (2018), which was conducted to estimate the technical, allocative and economic determinants of efficiency and inefficiency in off-season red pepper and bell pepper production in Punjab, Pakistan, primary data were collected from 70 off-season red pepper and bell pepper growers with simple random sampling in 2014. According to the results of the research, in terms of input usage per unit area, while the use of seeds was

0.17 kg per decare, the average use of NPK fertilizer was 67.43 kg da^{-1} in red pepper production, it was determined that this value was higher (71.26 kg) in large-scale enterprises. It was determined that the average number of chemical applications was 25.06 and it was found that medium-sized farmers applied more chemicals. While on average, 25.61 hours of irrigation is required for the production of this product, it has been determined that medium-sized enterprises irrigate 29.59 hours per da^{-1}. In this study, however, it was determined that an average of 89.72 kg da^{-1} of fertilizer was used per unit area (44.91 kg da^{-1} of pure fertilizer).

In a study conducted for the determination of the profitability of pepper production in Kaduna State of Nigeria in order to define the relationship between the socio-economic variables of the farmer and the profitability in pepper production, Mohamed et al. (2016) suggested that an average yield of 111.86 kg da^{-1} per farm was obtained. In the research, it was found that the average fertilizer use per unit area per farm was 29.22 kg da^{-1} and the use of pesticides was 0.431 lt da^{-1}. In this study, however, it was determined that an average yield of 3094.57 kg da^{-1} was obtained per unit area per farm, 89.72 kg da^{-1} fertilizer and 509.27 ml da^{-1} pesticide were used.

The cost of pepper (capia) production on the basis of enterprise groups for the examined enterprises is given in Table 6 . When we examine the production cost of capia pepper within the study, the lowest cost was 458.32₺ da^{-1} in the enterprises in the second group considering the tillage and planting costs. The highest value was 479.25₺ da^{-1} in the third group, and the average was 469.66₺ da^{-1} (Table 6). It is understood that the highest cost item in tillage is the ploughing cost.

When the maintenance works are taken into account, it was determined that enterprises made an average expense of 553.88₺ da^{-1}, and the share of the manual hoeing cost in the maintenance costs is 61.36% in this respect. And according to the survey research it is found that some of the enterprises carried out these operations by family labour, while other enterprises used foreign labour.

It has been determined that the average cost in harvesting operations is 808.05₺ da^{-1} and 73.48% of this cost consists of collection costs. It is also found that hoeing and harvesting process requires a very high labour force for enterprises and this situation also affects the cost. However, in the research, it was determined that the highest cost was realized in the enterprises in the second group with 846.32₺ da^{-1}, and the lowest expense was in the third group with 784.61₺ da^{-1}.

Considering the part of the various expenses, the biggest expense item is found as the seedling cost with an average of 1952.76₺ da^{-1}. The ratio of seedling costs in total expenses is 40.82%. It was also found from the survey application that enterprises generally produced their seedlings in their own enterprises. In the study, the average of various expenses per enterprise was determined as 2214.97₺ da^{-1}.

Considering the cost of using chemical fertilizers, the highest amount was 615.33₺ da^{-1} in the first group, and the lowest was in the third group with 591.82₺ da^{-1}. The average fertilizer usage cost per unit area was determined as 602.91₺ da^{-1}. When the pesticide costs are examined, it was found out that the average cost per unit area was 133.83₺ da^{-1} and the lowest value was 129.51₺ da^{-1} in the first group, while the highest value was 135.79₺ da^{-1} in the second group.

It was found that the highest value for the soil tillage and planting, maintenance works, harvesting, various expenses, chemical fertilizers and pesticide costs were in the first group with 4813.12₺ da^{-1} and the lowest value was in the third group with 4761.26₺ da^{-1}, the average value of the enterprises was determined as 4783.30₺ da^{-1}. In the research, the value of the total variable costs according to the enterprise average was found as 4998.55₺ da^{-1}, and it was determined that the highest value was 5029.71₺ da^{-1} in the first group, and the lowest value was in the third group with 4975.52₺ da^{-1}. In the present research, the average field rent value of the enterprises was determined as 251.45₺ da^{-1} (Table 6).

Table 6: Capia pepper production cost in the surveyed enterprises

Production Operations	Processing Time	Number of Operations	Cost per Unit Area (₺ da^{-1})			
			Layers			
			1	2	3	Average
(A) Tillage and Planting		**1**				
Plough	November-April	2-3	122.86	114.75	122.29	120.46
Double Plaughing	March April	1	39.00	39.17	40.00	39.29
Triple Plaughing	April	1	45.48	45.00	50.86	47.83
Furrowing	May	1	35.24	32.50	35.86	34.8
Planting Work (by hand)	May	1	222.70	226.90	230.24	227.28
Total (in ₺ per da^{-1})			**465.28**	**458.32**	**479.25**	**469.66**
B) Maintenance Works						
Fertilizing by hand	May-August	4-5	29.99	28.94	31.26	30.30

Fertilizer Machine	May	1	13.47	13.60	13.21	13.38
Hoeing by hand	May-July	2-3	338.33	322.90	350.49	339.87
Hoeing Machine	May-July	1-2	46.00	50.00	45.00	46.67
Spraying (Herbicide) Machine	April	1	14.62	13.95	15.50	14.85
Spraying Work	May-August	1	35.85	30.80	29.48	31.67
Irrigation Work	May-August	15	50.93	49.13	44.94	47.7
Irrigation Plant Installation – Disassembling Labor	May-October	2	28.21	28.01	30.99	29.44
Total (in ₺ per da^{-1})			**557.40**	**537.33**	**560.87**	**553.88**
(C) Harvest						
Picking	August-October	5	592.90	617.40	580.77	593.76
Sorting Bag Loading	September October	5	75.00	80.30	74.74	76.27
Unloading	September October	5	29.07	32.56	28.04	29.52
Transport	September October	5	113.69	116.06	101.06	108.50
Total (in ₺ per da^{-1})			**810.66**	**846.32**	**784.61**	**808.05**
(D) Variable Inputs						
Seedling (manual)	April	1	1968.81	1923.50	1959.86	1952.76
Irrigation Facility Cost	April	1	71.57	70.60	67.03	69.22
Farm Manure Transport	November	1	35.56	35.79	35.71	35.69
Packaging	July-October	5	159.00	174.8	146.40	157.30
Total			**2234.94**	**2.204.69**	**2209.00**	**2214.97**
(E) Chemical Fertilizers						
Base Fertilizer (pure)	April	1	86.90	94.47	86.73	88.81
1. Fertilization	May-June-July	1	39.86	39.78	36.96	38.50
2. Fertilization	May-June-July	1	50.88	46.90	45.06	47.15
3. Fertilization	May-June-July	1	84.62	76.32	81.75	81.12
4. Humic Acid	May-June-July	1	19.88	21.40	18.75	19.86
5. Farm Fertilizer	May-June-July	1	78.94	88.84	74.34	79.87

6. Water Fee (cooperative)	April-September	1	78.25	79.50	86.81	82.40
7. Energy in Irrigation	April-September	10-15	176.00	165.00	161.42	165.20
Total (in ₺ per da^{-1})			**615.33**	**612.21**	**591.82**	**602.91**
(F) Agricultural Pesticide						
Agrochemical (Fungsit)	May-June-July	1-2	47,87	54,69	50,55	50,88
Agrochemical (Herbicide)	May-June-July	1	46,81	42,9	43,05	44,05
Agrochemical (Insecticide)	May-June-July	2-3	34,83	38.2	42,11	38,9
Total (in ₺ per da^{-1})			**129.51**	**135.79**	**135.71**	**133.83**
Total Cost (A+B+C+D+E+F) (₺ da^{-1})			**4813.12**	**4794.66**	**4761.26**	**4783.30**
Capital Interest (4.5%) (₺ per da^{-1})			**216.59**	**215.76**	**214.26**	**215.25**
Variable Cost Total (D) (₺ da^{-1})			**5029.71**	**5010.42**	**4.975.52**	**4.998.55**
General Administration Expenses (3%) (₺ da^{-1})			**150.89**	**150.31**	**149.27**	**149.96**
Land Rent (₺ da^{-1})			243.81	250.50	256.67	251.45
Constant Cost Total (E) (₺ da^{-1})			**394.70**	**400.81**	**405.94**	**401.41**
Grand Total of Expenses (D+E)			**5424.41**	**5411.23**	**5381.45**	**5399.95**

In capia pepper production, the production cost per unit area was determined to be the highest in the first group (5424.41₺ da^{-1}), and the lowest in the third group (5381.45₺ da^{-1}), and the average cost value of the enterprises was 5399.95₺ da^{-1} (Table 6).

The gross profit and net profit values of capia pepper production grown in Çanakkale are shown in Table 7. When the gross profit and net profit values in capia pepper production are examined it has been calculated that the average yield value of the enterprises in the first group is 3635.28 kg da^{-1}, product sales price is 1.03₺ kg^{-1}, production value is 3744.34₺ da^{-1}, total cost is 5424.41₺ da^{-1}, gross income is -1285.37₺ da^{-1}, net income -1680.07₺ da^{-1}, relative profit is 0.69. While the average yield value per unit area of the enterprises in the second group was determined as 3686.71 kg da^{-1}, product sales price was 1.19₺ kg^{-1}, production value was 4387.18₺ da^{-1}, total cost was 5411.23₺ da^{-1}, gross income was -623.23₺ da^{-1}, net

income was -1024.05₺ da^{-1} and relative profit was 0.81. It has been calculated that Capia pepper yield value of enterprises in the third group is 2952.20 kg da^{-1}, product sales price is 0.84₺ kg^{-1}, production value is 2479.85₺ da^{-1}, total cost is 5381.45₺ da^{-1}, gross income is -2495.67₺ da^{-1}, the net income is -2901.60₺ da^{-1} and the relative profit is 0.46. Considering the average values of the enterprises, it has been calculated that the yield is 3094.57 kg da^{-1}, product sales price is 0.99₺ kg^{-1}, production value is 3063.62₺ da^{-1}, product cost is 5399.95₺ da^{-1}, gross income is -1934.92₺ da^{-1}, net income is -2336.33₺ da^{-1} and the relative profit is 0.57 (Table 7). It has been estimated that, on average, the ratio of the grand total expenses to tillage and planting operations is 8.70%, the ratio to maintenance works is 10.26%, the ratio to harvesting operations is 14.96%, the ratio to various expenses is 41.01%, the ratio to chemical fertilizers is 11.17%, the ratio of drugs to agricultural drugs is 2.48%. The ratio of average variable costs to total expenses has been determined as 92.57%.

From the interviews carried out with the producers during the survey studies, it has been determined that the sales price of capia pepper is between 2₺ kg^{-1} and 2.5₺ kg^{-1} in the 2019 production season, and the average sales price in the 2020 production season has been determined as 0.99₺ kg^{-1} in the study. It is considered that this situation significantly affects the profitability of capia pepper in the 2020 production season (Table 7).

Table 7: Below shows the gross profit and net profit values in capia pepper production grown in Çanakkale province.

Income-Expense Summary	Business Size Groups			Average
	1	2	3	
Yield (kg da^{-1})	3635.28	3686.71	2952.20	3094.57
Product Sales Price (₺ kg^{-1})	1.03	1.19	0.84	0.99
Production Value (₺ da^{-1})	3744.34	4387.18	2479.85	3063.62
Cost (₺ da^{-1})	5424.41	5411.23	5381.45	5399.95
Cost (₺ kg^{-1})	1.49	1.47	1.82	1.74
Gross Income (₺ da^{-1})	-1285.37	-623,23	-2495.67	-1934.92
Net Income (₺ da^{-1})	-1680.07	-1024.05	-2901.60	-2336.33
Relative Profit	0.69	0.81	0.46	0.57

When the gross profit and net profit values in capia pepper production grown in Çanakkale are examined, it has been determined that the enterprises with the highest productivity value are in the second group, and the lowest efficiency value is in the enterprises in the third group. The average yield value obtained from the unit area in the examined enterprises has been calculated as 3094.57 kg da^{-1}. In the study, the minimum yield

value of capia pepper has been determined as 1500 kg da^{-1} and the maximum yield value has been determined as 6000 kg da^{-1} among the enterprises. The average sales price of the product has been determined as 0.99₺ kg^{-1}. It has been understood that the highest selling price of the product is realized by the businesses in the second group with 1.19₺ kg^{-1}. The research was carried out in Biga, Bayramiç and Yenice districts of Çanakkale province. When the sales prices of capia pepper are examined, it has been determined that the highest sales price value on the basis of districts is in Bayramiç district with 1.71₺ kg^{-1}. It has been estimated that this price is 0.80₺ kg^{-1} in Yenice District and 1.22₺ kg^{-1} in Biga District. It is thought that this price difference between the districts depends on various criteria such as the harvest date of the product, market conditions, marketing opportunities, etc. It is also thought that it affects profitability and creates a difference between groups. During the survey studies, it has been detected that the pepper produced has been marketed with a high price in districts where the harvest time is earlier, that the factories have not made a purchase in cases where the market has been satisfied, that in these periods no exportation has been made and that the sales price of capia pepper has been decreased to the level of 0.35₺ kg^{-1} in Yenice district, where the production is the most intense.

Input usage amounts per unit area in capia pepper production in the surveyed enterprises are shown in Table 8. Examining the amount of input usage per unit area in the research, it has been determined that the average seedling use is 4477.63 da^{-1} in the enterprises, the highest seedling use is in the first group with 4557.14 da^{-1}, and the least seedling use is in the third group with 4445.72 da^{-1}. In the study, the highest use of seedlings has been determined as 6000 da^{-1} among 76 enterprises producing capia pepper, while the lowest usage level is determined as 3800 da^{-1} (Table 8).

Table 8: Input usage in capia pepper production

Inputs	Units	Business Size Groups			Average
		1	2	3	
Seedling	(piece da^{-1})	4557.14	4450.00	4445.72	4477.63
Fertilizer	Pure Fertilizer (kg da^{-1})	46.06	45.05	44.16	44.91
Fertilizer	Total Fertilizer (kg da^{-1})	89.19	90.40	89.64	89.72
Pure Nitrogen Fertilizer (Average)	(kg da^{-1})	16.16	15.73	15.89	15.92
Pure Phosphate Fertilizer (Average)	(kg da^{-1})	16.55	16.24	13.61	15.11

Pure Potassium Fertilizer (Average)	(kg da^{-1})	13.35	13.08	14.66	13.88
Pesticide	(ml da^{-1})	474.36	488.67	543.48	509.27
Herbicide	(ml da^{-1})	280.48	275.50	314.29	294.74
Fungucide	(ml da^{-1})	91.50	91.67	111.38	100.15
İnsecticide	(ml da^{-1})	102.38	121.50	117.81	114.38
Diesel Fuel	(lt da^{-1})	15.99	16.47	15.45	16.09
Energy Used in Irrigation	(lt da^{-1})	30.88	28.95	28.32	28.98

The average value of the total amount of fertilizer use per unit area in the examined enterprises is 89.72 kg da^{-1}, and it has been determined that the lowest use is in the enterprises in the first group with 89.19 kg da^{-1}. When the pure fertilizer usage is examined, it has been determined that the average use of pure nitrogen is 15.92 kg da^{-1}, and the highest nitrogen fertilizer use is in the first group with 16.16 kg da^{-1}. The average value in the amount of pure phosphorus use is 15.11 kg da^{-1}, and the lowest use is in the third group with 13.61 kg da^{-1}. Considering the use of pure potassium, it has been calculated that the average value in capia pepper production is 13.88 kg da^{-1}, the lowest use is in the second group with 13.08 kg da^{-1}, while the highest value is in the third group with 14.66 kg da^{-1}. Manufacturers have stated that they use fertilizer in capia pepper production by consulting the agricultural credit cooperative officials, the dealers, the technical personnel in the provincial/district agriculture and forestry directorates, the chambers of agriculture and the farmers they think are more knowledgeable in the region.

In the conducted research, it has been determined that capia pepper producers also use farm manure in order to increase the amount of organic matter in the soil. However, due to the very limited sale of farm manure, it has been determined that the enterprises primarily prefer to use the animal manure in their own enterprises. In the study, it has also been determined that some producers use humic acid in capia pepper production.

When the use of agricultural pesticides in capia pepper production is examined, it has been found out that the majority of the producers in the surveyed enterprises use herbicides before cultivating the soil and most of the agricultural pesticides used are herbicides. The average herbicide usage amount per unit area in the examined enterprises has been determined as 294.74 ml da^{-1}, and the fungicide usage amount has been determined as 100.15 ml da^{-1}.

The average value of fuel (diesel) usage level in capia pepper production in terms of enterprises is 16.09 lt da^{-1} and the lowest fuel usage amount belongs to the third group enterprises with 15.45 lt da^{-1}. The research has revealed that the highest amount of diesel in

capia pepper production is consumed in soil cultivation processes. In the study, it has been shown that the average amount of diesel use in capia pepper irrigation in the enterprises is 28.98 lt da^{-1}, and the highest use is in the first group enterprises with 30.88 lt da^{-1}.

According to a study by Candemir et al. (2012), which was carried out on organic red pepper production in Kahramanmaraş conditions between 2004-2008, during the crop rotation in 2008, 1843 kg da^{-1} fresh red pepper, 1010 kg da^{-1} beans and 295 kg da^{-1} cotton were obtained from the unit area. The unit cost of organic red pepper was 1.27₺ kg^{-1}, and the average organic red pepper price received by the producers was 1.34₺ kg^{-1}.

Başaran and Engindeniz (2015) conducted a study in Torbalı District of İzmir, in which the unit cost of the enterprises engaged in pepper cultivation was calculated as 0.54₺ kg^{-1}. In this study, the average kg cost of the product in the enterprises growing capia pepper was calculated as 1.74₺ kg^{-1}.

In the study conducted by Aytop and Akbay (2018) in order to calculate the cost and profitability of Maraş pepper production in the provinces of Kahramanmaraş, Gaziantep and Kilis, and to determine the physical production inputs used, it has been determined that the average yield value of the enterprises is 1558.01 kg da^{-1}, variable costs are 1671.94₺ da^{-1} fixed costs are 255.70₺ da^{-1}, and total production costs are 1927.64₺ da^{-1}. In Maraş pepper, the average selling price of the product was estimated as 1.56₺ kg^{-1}, the unit cost of the product as 1.24₺ kg^{-1}, and the income from the sale of the product as 2430.50₺ da^{-1}. The conducted research has revealed that the unit cost in capia pepper production is 1.08₺ kg^{-1} in Kahramanmaraş, 1.18₺ kg^{-1} in Gaziantep, and 1.35₺ kg^{-1} in Kilis. In this study, however, it has been determined that total production costs in capia pepper production are 5399.95₺ da^{-1}, gross income is 1934.92₺ da^{-1}, product value is 3063.62₺ da^{-1}, relative profit is 0.57, average kg cost is 1.74₺ kg^{-1}.

In the study conducted by Ukav (2018) in order to calculate the production costs of tomatoes, cucumbers, peppers and eggplants grown in the Kahta district of Adıyaman province, to determine the monetary values of the inputs used, to determine the gross production values and to compare the product profitability, it has been determined that the net profit for pepper is 2245.17₺ da^{-1}. While the lowest cost per unit is in cucumber, the highest cost is in pepper production. The product with the highest relative profit value was determined as pepper. In this study, the net income in capia pepper has been calculated as -2336.33₺ da^{-1}.

In a study carried out in the province of Antalya Bayramoğlu et al. (2021) suggested that the gross profit of 1 kg of pepper production was 0.39₺, the net profit of 1 kg was -0.24₺, and the production cost of pepper was calculated as 2.41₺ kg^{-1} in terms of the average of the

enterprises. 73.73% of this value consists of variable costs and 26.27% of fixed costs. Among the variable costs, the highest share belongs to material with 16.45%, seasonal labour cost with 14.49% and fertilizer with 14.34%, respectively. The highest share in fixed expenses belongs to family labour wages with 11.39%. In this study, however, the average gross income per unit area was calculated as -1934.92₺ da^{-1}, net income as -2336.33₺ da^{-1} and variable costs as 4998.55₺ da^{-1}.

While the findings obtained in the research (in terms of yield, production value, gross profit, net profit and input costs) are similar to some research findings, they differ from the other research findings. Here, as the main factor, yield value may vary depending on the soil structure of the land, the irrigation status and the amount of input used. Similarly, different subsidy policies applied by countries to agricultural products may affect the product purchase price and naturally the production value, gross profit and net profit value of capia pepper. In this research, the main reason why the capia pepper production activity is not profitable is that almost all of the profit margin in capia pepper is taken by the traders, since the producers cannot influence the price formation in the market.

6. Conclusion and Recommendations

According to the United Nations Food and Agriculture Organization (FAO) 2019 data, 1130203768 tons of fresh vegetables were produced in an area of 596891740 decares in the world. Throughout the world, pepper production areas constitute 3.34% of the vegetable production areas and 3.36% of the total production amount. According to the data of the Turkish Statistical Institute (TSI), the total pepper production area in Turkey has reached the level of 777862 decares in 2020. Çanakkale province, which is determined as the research area, ranks first in terms of capia pepper production areas and production amount throughout the country.

It has been determined that 33.74% of the plant production area in the examined enterprises is capia pepper production. The study revealed that capia pepper is in the first place with 47.45% in vegetable production value of the enterprises. This product is followed by corn (for silage) with 29.73% and tomato with 7.46%.

According to the sampling method applied in the study, it has been determined that 3642000 kg of capia pepper is produced on an area of 1176.9 decares in 76 agricultural enterprises. For the production of 3233 kg of capia pepper in one decare of the surveyed enterprises, 4454 capia pepper seedlings, 44.51 kg of pure fertilizer, 485 ml of agricultural

pesticides, 3.26 hours of machine drawing power, 19 lt of diesel fuel and 100 hours of human labour are needed. However, in order to earn 2936₺ capia pepper income in one decare area, 1943₺ of capia pepper seedlings, 253₺ of pure fertilizer, 105₺ of agricultural pesticides, 382₺ of machine drawing power, 2312₺ of diesel and 1387₺ of human labour are needed.

It has been determined that average yield in the examined enterprises is 3094.57 kg da^{-1}, product sales price is 0.99₺ kg^{-1}, production value is 3063.62₺ da^{-1}, product cost is 5399.95₺ da^{-1}, gross income is 1934.92₺ da^{-1}, net income is -2336.33 ₺ da^{-1}, relative profit is 0.57.

The research has shown that the main source of income of many agricultural enterprises in the district is capia pepper. However, while the sales price of capia pepper was around 2-2.5₺ kg^{-1} in the 2019 production season, the average sales price for the 2020 product was determined as 0.99₺ kg^{-1} in this study. It has been determined that this situation, which negatively affects the income of the product from the unit area, is specific to 2020 period in the study. In the recent study, it has been stated that the producers found the price of capia pepper to be low and they had serious problems in the marketing of the product.

The data of the Turkish Statistical Institute has shown that the capia pepper production area is gradually increasing throughout the country. While the producers in the regions where the product is harvested early are advantageous in the farmers' bazaar and in the market, it has been determined that the producers are willing to sell their products at a lower price due to the saturation of the market in the regions where the harvest time is delayed. It has been observed that the majority of the factories in the provinces located in the Southeastern Region of Turkey purchase capia peppers from nearby provinces due to the transportation cost, and thanks to this situation, the production area has increased in the provinces where the purchase is made. It is also thought that contracted production has a significant share in these regions. For this reason, it is possible to increase the production value of capia pepper obtained from the unit area if contract agriculture becomes widespread in the research area.

Considering the production cost of capia pepper, it is understood that the seedling cost has a very high share. However, it has been determined that the majority of the producers in the research area reduce the production cost since they produce seedlings in their own enterprises.

The research has shown that the rate of soil analysis in the parcels used in capia pepper production is quite low, this affects the amount of fertilizer use and causes an increase in the production cost. At this stage, capia pepper producers need to be made aware of taking soil samples to represent the parcels they produce and using the most appropriate fertilizer at the

time and amount desired by the plant, according to the results of the analysis. However, in some areas where capia pepper is grown, it has been determined that adequate irrigation cannot be done. If adequate importance is given to the irrigation infrastructure in these areas, a higher level of efficiency could be obtained in the production of capia pepper in the examined enterprises.

Although Çanakkale ranks the first in Turkey in terms of capia pepper production in terms of cultivation area and production amount, it has been determined that there is no organized structure such as cooperatives or unions related to capia pepper in the research area. Ensuring an agricultural organization for the marketing of this product in Yenice district, where capia pepper production is the highest, will play a crucial role in both increasing the income of the producer and providing the consumer with capia pepper at affordable prices, as well as the price stability of this product.

In the recent study, it has been concluded that in order to provide the capia pepper production at the quality demanded by the market, to ensure the price stability and market guarantee for the producers, it is necessary to adopt an organised structure which will operate in a systematic way. Also establishing facilities, which could provide added value to the product, such as cold storages, drying machines and roasting complexes and increasing the number of these facilities could be beneficial for raising the profit. It is possible to overcome the disadvantageous situation created by the location of Yenice district by strengthening the logistics infrastructure.

7. References

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