Physical inputs and cost analysis in radish production in Turkey

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Abstract

The purpose of this study is to calculate the production costs of radish, to determine the profitability of radish production and the input requests in Kadirli district of Osmaniye city where almost 71% of overall radish production in Turkey is handled. This study is based on the primary data collected from 61 randomly selected producers from Kadirli. Total amount of yield, profitability and cost calculations were made based on the data collected from producers regarding the production area and overall quantity, sales price and also prices and amount of inputs. The shares of these inputs were evaluated within overall amounts used in production and their total costs. Findings stated that the average radish yield was calculated to be 3652.37 kg / decare. The most important item among the cost elements is the temporary workforce. 1 kg of radish cost is calculated as 0.07 USD while net profit for 1 kg of radish is 0.05 USD. In order to ensure price stability and continuity in the production which is a vital source of income for the region, it is necessary to plan the production process and provide support to producers.

Key words: Economic Analysis, Cost Analysis, Radish, Economic Viability

1. Introduction

Whatever their field of activity, all businesses were established for the same purpose. The most basic aim of the enterprises is to make profits, and they carry out their activities around this purpose. This is also true for businesses operating in agricultural areas, as it is true for field of business. However, at the heart of all agricultural activities lies production which fundamentally distinguishes it from others. The key aim of agricultural production is to increase the amount of production, productivity of the farmers and to strengthen the agricultural enterprises by means of increasing the overall production level and total amount of disposable income of the farmers via utilizing the soil, climate, water and labor in most efficient and harmonious way (Birinci and Kucuk, 2004; Gundogmus, 1998). Businesses need to have a strong economic structure so as to move towards specific objectives, both for general purposes and for their businesses. The strengthening of the economic structure

depends on the increase in income (profits) to be acquired. However, the economy is not always able to reach the desired point. Various deviations can occur due to the negativities arising from the structure of the business or the general economic structure. In fact, these deviations may be higher in agricultural activities where production conditions are more affected by external factors. Regarding production conditions; recently among crucial problems of agriculture in Turkey; high product costs, the inefficiency of economic organization of producers, small and fragmented business structure and accounting records are not kept in the vast majority of agricultural enterprises (Keskin et al. 2014). The fact that the accountant which reflects the results of the business activities to its users of the information and which is a process producing a variety of informative outputs related to the business cannot find enough usage area in the agricultural sector causes the agricultural production costs not to be stated clearly. At the same time, farmers operating in the agricultural sector are generally lacking in entrepreneurial aspects, and their production following classical understandings reduce efficiency and productivity in agriculture and result in less value-added products. Since agricultural production depends to a great extent on climate conditions and fluctuations in product prices make the producer's income uncertain, besides taking conscient production decisions, it is necessary to calculate the quantities and costs of inputs used in production which are critical in the decision-making process (Tatlidil, 2000). Determining the costs clearly in production is very important as it also determines the price policy of the operator. It is vital for an enterprise to be able to establish a cost-price balance for producers, who are also affected by prices that are already volatile according to market conditions, so that at least they will be able to make enough profit to ensure continuity of their activities. The investigation of production costs and income, as well as the assessment of economic activities of enterprises, it can also be used for many different purposes such as business accounting, producer welfare analysis, agricultural income accounts, regional, national and international competitiveness analyses, profitability, productivity calculations, agricultural policy analysis, income support, agricultural credit, production planning, agricultural projections (Keskin et al. 2014). Therefore, the costs are important not only from the perspective of business but also from the perspective of economic actors. Especially when considered from the perspective of establishing agricultural projections which are among the basic policies of a country, it is important both in economic and social issues. Calculating the production costs in the agricultural sector is not limited with its benefits to decision-making mechanisms in agricultural enterprises, will also provide the basis for agricultural policies

(Bayramoglu, Goktolga, and Gunduz, 2005). In this way, it is clear that the state will contribute considerably to decision mechanisms. When it is considered in the context of cause-effect relation, it is vital to determine production costs concerning business economies and public economy in general, since agricultural activities will be directed depending on the decisions that the government takes. In addition to the studies on input usage and production planning at the regional and national level, cost studies are also important regarding enabling the provision of basic data on many fields such as the establishment of foreign trade measures related to agricultural products (Ozkan and Yilmaz, 1999). Given the theory of comparative advantages, countries specializing in a specific field of production are involved in the natural functioning of the economy to ensure income and expenditure over that field. Therefore, it is an inevitable necessity to use the agricultural area concerning access to the power of competitiveness at the international level by determining the agricultural costs for a country aiming to have a comparative advantage. As in many countries in the world, the agricultural sector not only constitutes a fundamental part of the livelihood in Turkey also it creates employment opportunities and is a vital economic basis. If also to be evaluated regarding geographical and climatic conditions, Turkey is a country with large agricultural areas and fruits and vegetables that can be produced efficiently in virtually every geographic region throughout the year. At the same time, the products obtained from agricultural production can be divided into different types due to ecological differences while they also high in quality. In terms of the breadth of production areas and the production conditions in these areas, Area TR63 (Hatay, Kahramanmaras, Osmaniye) emerges as a region located above the average of Turkey in terms of agricultural production values. Osmaniye province has 125012 hectares of agricultural land and has a total area of 327982 hectares, and 84% of the agricultural areas it owns are 104746 hectares (DOGAKA, 2015). Due to the favourable conditions Turkey is one of the major producers worldwide regarding fresh fruit and vegetables.

Among the winter vegetables, radish is a reasonably profitable product that can be grown in almost all seasons during the shorter planting period and is well-dispersed in light, nutritious, rich and moist soils (Saeed et al. 2015). Radish is a vegetable growing in a wide geographical area in temperate climates all over the world. Terrestrial climatic conditions are not suitable for radish. Regions, where the annual temperature is between 12 and 20 degrees, are ideal. In extremely hot and cold climates, root development is damaged. Sudden temperature increase, early and late frosts adversely affect root development. Day length is another critical factor affecting radish development (Anonymous, 2018). According to data

provided by Turkey Statistical Institute (TUIK, 2018) total production amount of radishes in Turkey is 178 344 tons as of 2017. Because of the high temperature and humidity requirements, particularly in the Mediterranean region, including Aegean, radish is grown in the coastal areas of Marmara and the Black Sea (Anonymous, 2018). For producers in Kadirli district of Osmaniye province, radish is an outstanding product and source of income. In 2017, a total of 126,000 tons of radishes were produced in 36,000 decares in the Kadirli province of Osmaniye city (GTHB, 2018). Radish production in Kadirli constitute approximately 71% of total production in Turkey. From this point of view, Kadirli radish production in general and in particular with the county's economy provides a significant contribution to Turkey's economy. In addition, Kadirli is one of the important production centers especially in terms of winter vegetables.

This study aims to identify overall production cost, state of profitability and input requests required in production regarding radish production in Kadirli of Osmaniye city where approximately 71% of overall radish production of Turkey is carried out.

2. Literature Review

Although the cost analysis related to different agricultural products made in Turkey, a study on the cost of the radish is not available. In the international literature, there are several studies on the cost of radish.

Khatun et all. (2016), in a study entitled “Evaluation of production potential and economics of Radish-Potato/Maize-T. Aman cropping pattern in Rangpur region” was conducted to determine the yield and economic consequences of two cropping patterns viz. improved cropping pattern (Radish-Potato/Maize-T. Aman rice) and farmers’ pattern (Potato/Maize-T. Aman rice) through incorporation of modern high yielding varieties and improved management practices for crop production. The experiment was laid out in randomized complete block design with six dispersed replications in farmers’ field condition in Domar, Nilphamari in three consecutive years 2009-12. Three years mean data showed that the improved management practices for the pattern provided significantly higher yield in improved pattern. The gross return (Tk. 4,32,990/ha) and net return (Tk. 1,98,324/ha) of improved pattern were 33.56 % and 24.93 % higher, respectively compared to that of farmers’ pattern with 45.44% extra cost. The higher marginal benefit cost ratio, land use efficiency and

production efficiency indicated the superiority of the improved pattern over the farmers' practices.

Saeed et al. (2015), in study entitled "Faisalabad Peri-Urban Radish Production And Marketing Economy" uses primary data collected from 70 radish growing farmers selected randomly from peri-urban area of district Faisalabad, Pakistan. It was found that majority of farmers were not following recommendations of the agriculture department regarding seed rate, fertilizers, and irrigations. Majority of respondents (94.2%) reported the local Meno as the best yielding variety. Imported and 40 day varieties were not popular as only 5.8% farmers were cultivating these varieties in the study area. On the basis of survey data, benefit cost and total factor productivity analyses depict that radish cultivation is a profitable enterprise in the study area. Productivity gap between current and potential yield of radish can be minimized by the adoption of recommended production and marketing practices.

Rani et all. (2013), in study entitled "Profitability Analysis of Organic Cauliflower, Radish, and Turnip Produce at National Agriculture Research Center, Islamabad, Pakistan." discuss the costs and returns structures in the production of vegetables (Cauliflower, Radish and Turnip) grown under the National Institute of Organic Agriculture (NIOA) at National Agriculture Research Centre. Therefore the aim of the paper is to determine the cost of production and estimate the profitability of different selected vegetables. The results indicate that yield of the vegetables was low but the prices of the vegetables were high. All the organic vegetables produce at the NIOA earn positive income without the land rent. In the production of the radish and turnip more labour used as compare to the cauliflower due to the picking of the vegetables. Cost –Benefit ratio was 1.43, 1.35 and 0.85 for turnip, radish and cauliflower respectively. The paper concludes that organic vegetables are profitable but less than the conventional vegetables. But it is hard to measure the profitability of organic vegetables due to the value of unseen indirect benefits.

Seran and Brintha (2009), in Sri Lanka, experimented experimentally to produce biologically and economically more effectively for the radish, which has a wide range of consumption, medical and industrial values. As a result of the study, the results of the cultivation of radish with amaranthus plant in order to increase the productivity and to reduce the costs reached.

The study entitled "Economic Analysis of Radish Growing in the Sindh Sultanabad Region" by Khushk and Hisbani (2003) is based on primary data collected from randomly selected 100 growers in Sultanabad area district Hyderabad in Sindh. Two varieties are

commonly grown in the study area, i.e. “Japani” and “China”. It was investigated that majority of the growers did not follow the recommendations made by the experts particularly for use of chemical fertilizers. The radish yield was estimated which ranges between 290 to 1230 with an average of 750 mds ha. Morover, it was investigated that farmers had received higher price in the early season than the mid and late season. It was also found that radish cultivation in Sultanabad area has a great potential because growers had earned better net returns.

In literature are many studies on cost in agricultural products. Some of these studies regarding cost analysis are given below.

Gözener (2018) aimed to determine the production cost of peanuts. As a result of the calculations, sunflower production cost is determined as 850 USD tonnes^{-1}, and the revenue from the production (except for the supports) is determined as 1080 USD tonnes^{-1}.

Karsan and Gül (2017), in their study aimed to examine the change in the potato production costs and profitability in Niğde province in 2000-2014 period. In Niğde the absolute profit obtained from the potato production was calculated as 355.6TL/da for 2014. Among the examined years, the year in which the highest absolute profit was 2005 with 450.8 TL/da and the lowest absolute profit was in 2012 with -329.7 TL/da. Gross production value can meet the production costs in all of the examined years except for 2012. However, with the increase in production costs, absolute and relative profits tended decrease.

Parlakay et al. (2016) aimed to determine the production cost of sunflower produced for oil in dry conditions and to estimate the technical efficiency of the enterprises. As a result of the calculations, sunflower production cost is determined as 585,36 USD tonnes^{-1} , and there venue from the production (except for the supports) is determined as 560,00 USD tonnes^{-1}. In the study, it is recommended that without supports given for the sunflower production, producers would make a loss and the supports should be continued.

Karadas (2016) aimed to determine wheat production costs in wheat producing agricultural enterprises in Ağrı province. Karadas (2016) aimed to determine wheat production costs in wheat producing agricultural enterprises in Ağrı province. According to the results of the study, 88.00% of wheat production costs consists of variable costs while the remaining 12.00% was constituted by fixed costs. 34.50% of variable costs were costs for soil preparation while 28.90% were maintenance costs and 32.00% were harvest costs. 78.00% of the fixed costs were field rents. 1 kg of wheat was sold for 0.58 TL and 1 kg hay was sold for 0.30 TL. Producers earned -0.03 TL da^{-1} of gross profit from wheat production and net profit

of -26.68 TL da^{-1}. Due to low yields and low prices in the year of the study, producers could not make any profits from wheat production.

Topçu et al (2015) the variable cost of sugar beet production cost is 81%, fertilizer and irrigation water with soil preparation and harvesting-blending workforce are used more and the yields are decreased. Therefore, unit sugar beet production cost was calculated as 0.125 TL / kg and product purchase price was determined as 0.12 TL / kg. Net profit was found to be -7.45 TL / da.

Weiss (2015)'s study is organized in order to present an analysis measuring the costs of production of small family farms. What can be seen is that each member of 2,268 family members involved in production according to information from Afubra, has a monthly return of R $ 406.31. Using the same values, average of 2.09 hectares cultivated, average value received per kilogram of R $ 6.35, costs of R $ 14,542.01 per hectare is obtained.

Yahaya et al. (2015) aimed to examine the economics production of cocoa in Eastern Region of Gana. Results of the analysis showed that the average production cost of cocoa was GHC 1.34 per kg and profit margin was GHC1.80 per kg in cocoa producer enterprises. The gross margin and net profit were calculated as GHC 956.78 and GHC 621.24 per hectare respectively. Relative profit was calculated as 1.49 which indicates that cocoa production in the study area is profitable. Farm size, farmer's age, farming experience and other cost less labour cost were identified as the significant factors affecting the output of cocoa production in the study area.

Bayramoglu et al. (2005), in their research, some important field crops (sunflower, wheat, bulb and sugar beet) physical production inputs and the cost of production of these products It is calculated. Results show that onion is the most profitable production activity among crops although it has the highest production cost per decare. Sugarbeet is a product that has the highest proportional profit. It is followed by onion, sunflower, and wheat, respectively.

Birinci and Küçük (2004) aimed to determine the physical input requirement and production cost for the production of wheat on the farms in Erzurum province. It was found that for the average farm per decar, 12,85 hours labor and 5,71 hours tractor power were needed and 1 kg of wheat production cost is 375 540 TL.

Gündogmus (1998) is to determine the physical input requirements and production cost for the production of winter wheat and also to investigate input/output relationships on the farms of Akyurt district. It was found that for the average of farms, per decar 2,54 hours

labour and 1, 23 hours tractor power were needed and 1kg of winter wheat production cost is 2.903, 1 TL's.

3. Materials and Methodology

The primary material of this study is the data obtained by questionnaire from the farmers, registered in the Farmer Registration System, who produce radish in the Kadirli province of Osmaniye city. There are 69 villages in Kadirli province and 3761 farmers registered in these villages. About in 59 of these villages, radishes are grown by almost 522 farmers. Enterprises that produce radishes are stratified according to land size groups. Among Stratified Sampling Methods, Neyman method was used to define number of samples to be polled (Yamane, 2001).

$$n = \frac{(\sum N_h S_h)^2}{N^2 D^2 + \sum N_h S_h^2} \quad (1)$$

In the formula;

N: Number of businesses in the population

n: sample number

Nh: Number of businesses in the h.

Sh: standard deviation of the h. layer

S2h: variance of the h. layer

D^2 is (d^2 / z^2), d is the deviation from the mean (1%) in the mean (mean of the parent mass is 82.23, taken at about 0.82 as 10%) and z represents the z-table value (2.58) corresponding to the 99% confidence limit.

The number of samples to represent the central mass using the Neyman method was calculated as 56.56. 61 questionnaires were made in practice given the possibility of incorrect questionnaires. A proportional method was used in the stratified distribution of the calculated sample size (Table 1). Surveys were completed in 29 villages in June-July 2018, as far as possible all villagers who made radish production were tried to be reached. The surveyed firms were chosen on random.

Table 1: Distribution of sample numbers by land size groups

Land Size Groups	Number of businesses	Number of Samples	Number of Surveys Conducted

0-50	240	27	29
51-100	199	21	21
150-250	59	6	6
251 and over	24	3	5
Total	522	57	61

By this questionnaire study, the unit product costs were determined by moving from the budget approach using the physical and financial data collected for the production year of 2017-2018. After the data were analysed, summary charts were prepared, and the physical and monetary values in these charts were arranged to express the simple arithmetic average of the enterprises. Average physical and financial values related to the production activity were calculated on average per unit area by dividing the total sowing area of the products.

Production costs consist of fixed and variable costs. Land rent/land capital interest, family and permanent labour costs, general administrative expenses and other expenses (amortization, instrument-machinery capital interest, insurance, tax, etc.) were taken as fixed cost elements related to the rad production activity within the scope of the study. The variable cost elements of this product are; seed costs, fertilizer costs, drug costs, temporary labour costs, cost of water consumed, instrument-machine fuel costs, tool machine maintenance and repair costs, and revolving fund interest costs. In the calculation of the radish production cost, the support for which the enterprises were benefited was not taken into consideration. In the calculation of the costs, only expenditures for radish production were considered in the operation. In other words, a single product budget analysis was used. In the product cost calculations, the physical quantities of inputs used in production were priced at the real prices paid by the businesses.

The fixed and variable costs of the machines were calculated on the basis of the total working time in the production of the crops in question since the producers in the region mainly use their own machine tools in production activities. Workforce demands of the tractor drivers were included in the labour demand. The data pertaining to instrument fuel costs were derived from the manufacturer for each activity. Repair and maintenance costs of machine tools were calculated by evaluating the average maintenance and repair costs according to the hours spent on each operation. Amortization and instrument machine capital interest were also transferred to fixed costs. Since the radish is a product grown in irrigated conditions, both the irrigation fee and the fixed and changing costs of irrigation investments were counted within

the overall cost calculation. The depreciation, interest, repair, and maintenance costs of irrigation investments were computed over the periods of use in radish production. The land rent, which is one of the fixed costs, was included in the calculation of the lease price paid for the lease and the lease rate for the land capital interest in the property land.

The family labour force and wages for permanent labour force used in production were calculated by regarding the labour costs in the region. 3% of variable costs were taken as general administrative expenses and 5% as revolving fund interest.

In the calculation of sales prices and gross production values, the selling prices of the main products which were handed over to farmers were taken into consideration. The profitability levels of the activities in the unit area were calculated by evaluating the success level of the radish production. The following formulas were used in the calculation of gross and net profits (Cetin, 2013).

Gross profit = Gross production value-changing costs,

Net profit = Gross profit-fixed costs.

In this study, costs and revenues were shown on the basis of unit area, and product costs were given per yield. The values given for the business groups are weighted average values.

4. Research Findings and Discussion

In the radish-producing enterprises, the average age of the operators was 46.28. It was seen that the operators are predominantly high school graduates (44.3%) followed by primary schools with 24.6%, secondary schools with 16.4% and college graduates with 14.8%. Operators are illiterate. It was also observed that there are operator with university degree whose total number is not to be neglected. Average number of individuals in a family is 4.77. 62.3% of the operators were found to be not working in any business other than agriculture, 37.7% are operating in non-agricultural business and agricultural activity is their extra business. Among the non-agriculture activities are commercial activities, civil service, labour, engineer, veterinarian or self-employment business. A group of retired farmers (8.2%) are engaged in farming in order to evaluate family income and earn additional income. On the whole of the enterprises, the operators themselves are working as family labour force on average 175.61 days a year. There is an operator expressing that he / she works in agricultural activities other than his / her own business and he / she works 150 days a year. In 16.4% of

the enterprises, a second person is working as a part of family workforce, while in 9.8% three members of the family in 3.3% four members of family are part of the workforce**.** Only 16.3% of enterprises employ foreign permanent workforce (over 6 months old). 50% of these workers are employed as drivers while 40% are recruited as unskilled-farmers in agricultural activities and 10% as guardians. While these workers are paid mainly on the minimum wage, daily wage payments are made to the above-mention unskilled workers based on the total number of days they have worked.

In Kadirli, cereal crops such as corn, wheat, peanut, sunflower and goods such as fresh vegetables and fruits are among the products grown mostly in the area. Watermelon and various vegetables are grown especially during the summer season while radish, spinach and leeks are produced intensively in winter. Rental of agricultural land is quite common. 58.2% of the land on which the radish production is made is owned by the operators themselves and the rest is the rented. The average rented land size is 265.7 decare and the average cost of land rented is 61.06 USD / decare. The average number of pieces in the radish fields is 5.28. All the planted arable is irrigated land, and the average land value is 4205.12 USD/decare. While only 21.3% of the arable land has been rehabilitated so far, the remaining land has not been done so yet and the average land rehabilitation value is 696.41 USD. 9.8% of the companies did not sell their yields due to prices getting down, they rather used the products as animal feed after ploughing the field. In the enterprises surveyed, 80% corn, 34% peanuts, 16% watermelon, 13% wheat, 12% spinach and sunflower as well as cotton, lettuce, soybean, black pepper and feed plants are also produced. While enterprises stated that 85.2% of them did not benefit from soil analysis support in 2017, the ratio of beneficiaries is 14.8%. 49.2% of the enterprises gained from fuel and fertilizer support. While the rate of the enterprises that benefit from the contribution support is 39.3% and the supported product is predominantly corn. The low rate of business benefiting from the subsidies is due to the lands being rented and the willingness of landowners to benefit from this subsidy for themselves.

In the enterprises surveyed, the average cost of radish production per decare is 252.48 USD, 69.76% of which is variable costs and 30.24% is fixed costs (Table 2). Rani et al. (2013) calculated the total cost of organic radish production as 27478 rupees (283.025 USD). Saeed at al. (2015) calculated the average variable costs in Pakistan at 31032.15 rupees/acre (307.22 USD). In Kadirli, variable costs are calculated as 176.13 USD / decare. Radish costs in Turkey are lower than the cost in Pakistan. The most significant cost factor in variable costs is temporary labour costs (64.07%). The main reason for this is the fact that the harvesting

and preparation for the market within the radish production process are all made entirely by hand. 72.44% of the temporary labour costs are in harvest and 19.97% in washing and packaging operations. Other areas where labour is used predominantly are irrigation and transportation.

Table 2: Radish Production Costs

	USD/decare	%	%
Total Temporary Labor Cost	112,86	64,07	44,70
Total Fuel Cost	15,21	8,63	6,02
Maintenance and Repair Expenses	3,01	1,71	1,19
Fertilizer	9,71	5,51	3,85
Agricultural Medicine	7,14	4,05	2,83
Seed	6,97	3,96	2,76
Other (Water and Sack)	16,83	9,56	6,67
Subtotal	167,74	95,24	66,44
Revolving Fund Rate (subtotal * 0.05)	8,39	4,76	3,32
Total Variable Costs	176,13	100,00	69,76
General Administrative Expenses (variable cost * 0.03)	5,28	6,92	2,09
Land Rental / Land Capital Interest	61,06	79,98	24,19
Family and Permanent Workforce	2,77	3,63	1,10
Other fixed costs (depreciation, machine interest, etc.)	7,23	9,47	2,86
Sum of Fixed Costs	76,35	100,00	30,24
Sum of Overall Production Cost	252,48		100

9.56% of variable costs cover water used for irrigation and sack costs used in packaging. The cost of landfill preparation, maintenance, and transportation of the tractor used in the production of radish is 15.21 USD, and it constitutes 8.63% of variable costs. It was seen that some farmers also made the fourth and fifth plow while three plow in are predominantly carried out in the soil preparation phase for yielding radish. Maintenance and repair costs of tools used in the production of the radish are 3.01 USD on average. The oil cost of the machines and tools was also included in the maintenance and repair costs.

Radish seed costs account for 3.96% of variable costs. The average is 650 gr. seed is thrown, and seeder does sowing. Khushk and Hisbani (2003) stated that in Sindh province, farmers use 2.0 to 2.5 kg/acre seeds. The amount of seed used in different regions varies depending on the seed used. Fertilizer cost constitutes 5.51% of total variable costs. Fertilizer

is predominantly used as base fertilizer, and this fertilization process is carried out together with the sowing process. As the fertilization process is done chiefly with the sowing, there is no additional cost except for the fertilizer. 20-20, 3-15 and DAP were used as the base fertilizer. Urea is also used as the top fertilizer, although there are not many businesses that apply top fertilizer. While the base fertilization uses 23 kg of fertilizer, 20 kg of the fertilizer is applied on the top compost. Drug costs account for 4.05% of variable costs. There is no additional cost for the pesticide application, and the pesticide is applied together with the irrigation. Almost all businesses use drugs against worms, as there are also businesses applying drug against fungi. The average recording is 0.53 gr of medicines are used. According to seasonal conditions, about 1-3 sprinkler irrigation and also one surface irrigation are carried out for radish grown in irrigated conditions. An average of 1.67 sprinkler irrigation and one surface irrigation were done in the enterprises surveyed during the 2017 production period. Approximately 5% of the variable costs were spent on water, and about 4% is the sack costs used during the pulp preparation stage.

The interest on the revolving fund represents the interest income that can be obtained if the capital used in the radish production was used in another process and was evaluated as opportunity cost. The revolving fund interest also constitutes 4.76% of the total variable costs.

Approximately 80% of the fixed costs constitute land lease/land capital interest. Land capital interest is the alternative cost of using the land in radish production. 9.47% of the fixed costs are depreciation for tools and machinery, interest in tools and machinery and other expenses. The family workforce and the permanent workforce constitute 3.63% of the fixed costs. Employees who work as permanent workers are often employed as drivers and as farm workers. Some of these workers work for 12 months with a minimum wage while others receive daily wage payments depending on the length of time they work in the farm. Approximately 7% of fixed costs consist of general administrative expenses. In the enterprises surveyed, the average yield was calculated as 3652.37 kg / decare (Table 3). Saeed et al. (2015) expressed an average radish yield of 6520 kg/acre in Faisalabad. Rani et al. (2013) calculated the organic radish yield as 5287 kg. The average radish yield in Kadirli is very low compared to the other studies in the literature. The radish yield varies according to the characteristics of the radish used and also to the region.

Table 3: Gross and Net Profit of Unit Production of Radish Production

Factors	Value

Yield (kg/decare)	3652.37
Sale price (USD/KG)	0,11
Gross Production Value (USD /decare)	419,48
Unfixed Costs (USD /decare)	176,13
Sum of Unfixed Costs (USD /decare)	76,35
Sum of Overall Production Cost (USD /decare)	252,48
Gross Profit (USD /decare)	243,35
Net Profit (USD /decare)	167,00
Production Cost (USD /kg)	0,07
Net Profit (USD /kg)	0,05

In the enterprises, the production cost per decare was calculated as 252.48 USD while the production cost of a kilogram was calculated as 0.07 USD. Businesses earn a net profit of 0.05 USD per kilogram, while net profit averages 167.00 USD per decare. Khushk and Hisbani (2003) calculated the total radish production costs as Rupees 44123 (758.92 USD) and the net profit of reserves as 30877 Rupees (351.08 USD). Saeed et al. (2015) calculated the net profit in Faisalabad was calculated as 35396.42 Rupees (350.43 USD) per decare. Although these margins are upper than they are in Turkey, due to sale prices are being greater, they are also higher in net profit.

Radish was sold at an average of 0.11 USD in surveyed businesses. However, the expected increase in production in 2017 caused the sales prices of the radish to decrease in the market. The decline in prices almost to the total value of the cost per yield, it led some farmers to plough the farm without harvesting the radish and using it as animal feed. In Kadirli, radish is sold mainly to traders beginning at mid-November even before it is harvested, while some of them are paid in advance, payment for the rest is deferred. Several producers in Kadirli also make radish trade and sell in different cities.

5. Conclusions and Suggestions

Radish production has a prominent place among the products produced as second yield in the enterprises in Kadirli district of Osmaniye city. At the same time, about 71% of the radish production carried out in Turkey are handled by the businesses operating in Kadirli. However, it was also seen that the producers in the region have problems in the production and marketing processes. Problems of recruiting labour during the production process, water

cuts, high input prices, difficulties in finding standard seeds, excess of the supply in the marketing process, price instability, market constraints, monopolization of large producers, problems caused by disturbed producers in organizing are among the issues voiced often by the farmers. Various measures must be taken to overcome these problems so that the radish production activity contributes more to the income of the regional farmers. According to cost analysis results, radish production in the region is a profitable production area. However, due to the lack of production planning and the favourable climatic conditions and high yields during the periods when many producers are turning to radish production due to high-profit expectations, the prices decrease, thus the profitability of the producers declines in turn. The highest cost element in the production of radishes is the temporary labour expenses among the other variable cost elements. The main reason for this is the fact that the harvesting and preparation of the market are handled manually. To avoid this cost factor, it was observed that the enterprises sold yields to the merchants in the early stages below the prices available in the market. Besides, the lack of storage possibilities of the relevant product leads to a high price imbalance, depending on the supply amount in the market, there results in yields to be used as an animal feed, either for sale at a price that is not satisfactory to the manufacturer or left unattended in the field. To remove the market problem and ensure price stability, the radish association established by the producers needs to work more effectively and take preventive measures to guard the radish producer. Also, educational activities and various field studies can be carried out to enable the operators to determine the production costs conclusively. If considered the role that the region has in radish production in Turkey, with a radish producers cooperative it may be possible to establish more effective and efficient production process and via ensuring the supply-demand balance by conducting market research, it might be possible to obtain the inputs from the lower values through the cooperative and accordingly to reduce the costs and to solve out the problems expressed by the producers.

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