Gross profit analysis in cotton production and effects of agricultural subsidies on product cost: a case study of Hatay Region-Turkey

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Abstract

The aim of this study is to determine the gross profit in cotton production in Hatay province and to examine the effect of agricultural subsidies on cotton production cost. The primary data of the study were obtained from 136 agricultural enterprises by using the Simple Random Sampling Method. Income per unit area was 922 TL/da, and with subsidies this number could increase at a level of 44% (408 TL/da more). The cost per kg was found as 2,0 TL in small enterprises, and 2,03 TL in large enterprises. The highest cost element was energy (regardless of ground rent). Energy usage per unit was found as 170 TL.According to the economic process results of cotton production excluding the subsidies; the gross profit was 135,79 TL/decare, the net profit was -151,57 TL/ decare, and the relative profit was 0,86 TL. Including the subsidies; the gross profit was 543,76 TL/ decare, the net profit was 256,40 TL/ decare, and the relative profit was 1,24 TL. This result proves that cotton producers' profits consist of subsidies. According to the research results, in order to continue cotton production in the research area; concrete steps should be taken to decrease energy costs used for irrigation, producer organizations should be more active about helping producers with obtaining input and marketing their products, and subsidy unit prices should be allocated at the same level as developed countries.

Keywords: Agriculture. Subsidy. Cotton. Cost. Gross Profit. Turkey.

1. Introduction

Fiber plants are grown for their fibers, and there are over 1000 species of fiber plants grown for various purposes throughout the world (Bellmann et.al., 2005). Fibers that are

obtained from these plants are being used to cultivate some products such as textile products, sacks, string, rope, paper, mats, brooms, etc. (Brink and Escobin, 2003). In terms of Turkey, the textile industry is the leading sector for export and employment. The textile industry employs around 3 million people in Turkey (Mert and Çopur, 2010).

According to FAO data, the global cotton fiber production amount was 26.156.675 tons in 2014. The biggest cotton producers in the world respectively are; India, China, USA, Pakistan, Brazil, Uzbekistan, Australia, and Turkey. These 8 countries produce 86,34% of the total global cotton production. Turkey is the 8th largest cotton producer (3,23%) in the world with 846.000 tons (FAO, 2017).

Due to the gap in supply, Turkey is one of the biggest cotton importers in the world. According to the TSI data, Turkey imported 876.534 tons of cotton for 1.689.005.000 US$ in 2013. According to the TSI data for 2016, 2.100.000 tons of unseeded cotton, 1.260.000 tons of cottonseed, and 756.000 tons of cotton fiber were produced in a 4.160.098 (da) area in Turkey. Hatay region, which was determined as the research area, takes up 11,54% of Turkey's total cotton production area, and has a 10,57% share in unseeded cotton, cottonseed, and cotton fiber production.

Some previous studies about cotton cost were presented as follows. In a study that was carried out by Dağıstan et.al. (2009) in Hatay, the cotton production cost was found as 2.246$/ha, and the benefit cost ratio was found as 1,24 that was economically productive. Özer and Özçelik (2011) were focused on determining an optimum product sale period for cotton by means of the Game Theory. In a study that was carried out by Alemdar et.al.(2014) in the Çukurova region, the production cost of some important field crops such as; wheat, first crop corn, after-crop corn, cotton, and sunflower were calculated. In the study, based on 2010 data, production costs were as follows; 0,52 TL/kg for wheat, 0,45 TL/kg for first crop corn, 0,46TL/kg for after-crop corn, 1,28 TL/kg for cotton, and 0,87 TL/kg for sunflower. Among these products, cotton was found the lowest in terms of gross profit (165,15 TL/da), relative profit (0,97), and net profit (21,78 TL/da). Özüdoğru et.al. (2015) conducted a study in the regions of Şanlıurfa, Aydın, Adana, Hatay, and Diyarbakır. Among these areas, Hatay's average land size of the enterprises that produce cotton was found as 462,39 da (246,35 da), the average land size of cotton production was 190,15 da (131,55 da), the average cotton productivity was 483,20 kg/da (489,02 kg/da), and the average sale price was found as 1,45 TL/kg (1,56 TL/kg). Another study that was carried out by Özüdoğru and Miran (2015), found subsidy pricing as the most important factor of a subsidy policy towards cotton,

sunflower, and soybean. In a study that was carried out by Yılmaz and Gül (2015) in Antalya, cotton production costs and profitability were determined. Based on 2011 data, the average gross production values of cotton production were found as 817,4 TL/da, and the cotton productivity average was found as 391,3 kg/da. Among production costs, labor cost was the highest. Also, the cotton production cost was found as 2,05 TL/kg, the absolute profit was 16,35 TL/kg, and the relative profit was found as 1.02.

In this study, gross profit analysis was conducted, and product cost was calculated in cotton enterprises in Hatay by considering the enterprise size. Contribution of subsidies to cotton production cost, and the effects of subsidies on cotton production profitability were researched. It was concluded that premium payment towards cotton production is essential.

2. Materials and Methods

Parent material of this study consisted of primary data that were gathered from cotton enterprises in Hatay by means of the face-to-face interview method between December 2016 and January 2017. Also, secondary data were gathered from FAO, related articles, the Republic of Turkey Ministry of Food, Agriculture and Livestock (MFAL), the Ministry of Development (Turkey), the Ministry of Customs and Trade (Turkey), Soil Products Office (Turkey), and the Chamber of Agricultural Engineers (Turkey). National and international reports were also used which were published by several organizations.

Because the cultivation area sizes of cotton enterprises weren't normally distributed, one of the Layered Random Sampling Methods, the "Neyman Method", was used (Erkan and Çiçek, 1996) to determine the sample size and the sampling frame. The formula of the method is given below (Yamane, 2010);

$$n = \frac{\Sigma\ (Nh\ Sh)^2}{N^2\ D^2 + \Sigma\ Nh\ (Sh)^2}$$

n: Sample size

S: Standard deviation

t: ''t value'' for the confidence interval

N: Total unit number that belongs to the sampling frame

D: The margin of error

In this study, 136 cotton enterprises were determined as the sample size with a 5% margin of error, and at a 95% confidence interval. Cotton enterprises were divided into two groups depending on their size as the following;

a) Small enterprise (>100 da)

b) Large enterprise (<100 da).

Production costs consist of fixed and variable costs. Variable costs change depending on the production volume, and these costs are usually easy to distribute. On the other hand, fixed costs do not depend on production volume, and they are usually calculated for more than one production period (İnan, 2016). Within the study, ground rent and general administrative expenses in cotton production were considered among the fixed costs. Variable cost elements were; seed expense, fertiliser expense, pesticide expense, temporary employment expense, irrigation expense, fuel (diesel) expense, electricity expense, machinery expense, and circulating capital interest costs.

Average input amounts were calculated by analysing the data that were gathered from cotton enterprises. Input amounts and production costs were determined in the cotton enterprises. Unit production costs and cost elements were presented depending on the enterprise size. Seed, fertilizer, and pesticide costs were considered when analyzing the input usage (Tanrıvermiş, 2000). In the calculation of running costs, current prices were considered by when the spending occurred.

The definition of cost is the total value amount of production factors that are used in the production process of a product or service (Erkuş, et.al., 1995). In plant production, variable cost elements consist of; seed expense, fertiliser expense, pesticide expense, temporary employment costs, irrigation expense, fuel (diesel) expense, electricity expense, machinery rent, and circulating capital interest. In the calculation of costs, only the costs which were spent towards a specific product were considered. In other words, a single product budget analysis was carried out. In the product cost calculation, inputs were priced depending on producer prices. In the case that enterprise sources were used, alternative (opportunity) cost took into consideration.

In order to calculate labor costs; payments for foreign labor force, and the average labor wages of the region for family labor force were taken into consideration. In the studies

of agricultural economics, machine pull costs (soil cultivation, etc.) should be calculated under machinery costs. Machinery costs are calculated by including some costs such as; amortization, interest of opportunity cost, maintenance costs, oil cost, fuel cost, etc. Also, machinery costs should be distributed into products. Since this process is very difficult to carry out correctly, machinery costs were calculated based on the opportunity cost principle, which assumes that these services are rented from outside the enterprise.

Variable cost interest represents the opportunity cost. It represents the interest yield that could have been gained if the expenses would have been spent on a different activity. If using these inputs in production means giving up on the interest yield, the variable cost interest is calculated as a cost. Therefore, the agricultural credit interest which is provided by the Republic of Turkey Agricultural Bank, is calculated considering the time period when the fund is being used on agricultural production (Kıral et.al., 1999). In this study the interest rates of 2016 for plant production, which was provided by the Republic of Turkey Agricultural Bank, were used in the calculation of variable cost interest.

Variable costs were assumed as being distributed homogeneously, and half of the variable costs were taken into consideration. Also, variable cost interest was calculated as half, because the cotton production process takes around 6 months (half a year). General administrative expenses consist of costs that are spent for conducting the enterprise. In agricultural enterprises (in this study as well), usually 3% of the total production costs is measured as general administrative expenses.

Gross profit was calculated by subtracting the variable costs from the gross production value, and the net profit was calculated by subtracting the production costs from the gross production value. Gross profit is a value that in an enterprise, allows comparing different production branches to each other in terms of profitability. Gross profit is a value that the enterprise owner gains with processes that use all fixed resources of the enterprise, and his/her effort as well. Gross production value is the sum of all values of production that are produced in an enterprise. Production costs consist of all the costs, which are fixed expenses and variable costs (including opportunity costs of the resources), to produce a specific product. Relative profit was used to compare efficiencies of the enterprises. Relative profits were calculated by means of proportioning production costs to gross production value. In this study, costs and incomes were presented based on unit area, and product costs were presented based on unit product. The values for enterprise groups are given as weighted averages.

Total Income (TI): Productivity (kg/da) x Product Sale Price (including subsidies)

Variable Costs: Soil Cultivation Cost + Planting Costs + Fertilization + Harvest + Transportation + Seed + Pesticide + Fertiliser

Fixed Expenses: Ground Rent + Several Expenses + Capital Interest + Administrative Expenses

Total Costs (Variable Costs): Soil Cultivation and Planting + Care Works + Harvest + Seed + Fertiliser + Pesticide

Several Expenses: Total Costs x 0,05

Capital Interest: (Total Costs + Several Expenses + Ground Rent) x 0,02

Administrative Expenses: (Total Costs + Several Expenses + Ground Rent) x 0,03

In the cotton production process, 3% of the variable cost is allocated as general administrative expenses. This ratio could increase to 7% in enterprises which are highly intensive (Kıral et.al.,1999). In this study, general administrative expenses were measured as 3%.

The Total Factor Productivity (TFP) was calculated with the formulas which are given below (Mc Connell and Dillon, 1997);

Gross TPF = Total Gross Output Value / Total Production Cost

Net TPF = Total Net profit / Total Production Cost

Gross profit is an important success criterion in determining competitive capacity, and it is being used to compare enterprises within the EU Farm Accountancy Data Network System (FADN) (Keskin and Dellal, 2011). Within the study, gross profit and net profit were calculated in order to evaluate the enterprises' income from cotton production.

Gross profit: Agricultural Income – Variable Costs

Net profit: Agricultural Income – (Variable Costs + Fixed Expenses)

In order to determine the cotton buying price, Commodity Exchange Market prices, and the fall and winter term prices of 2016 were taken into consideration. In addition, cotton buying prices and subsidies provided by the Ministry of Food, and Agriculture and Livestock were taken into consideration to calculate producers' cotton income. Turkish Liras (TL) were used as the currency of the study. The end of the year exchange rate (TL/US$) is shown in Table 1 to compare the values globally.

Table 1: The Central Bank of the Republic of Turkey (CBRT) Exchange Rate (TL/US$) (*)

Years	Exchange Rate
2001	1.446.638
2002	1.639.745
2003	1.393.278
2004	1.336.300
2005	1,3418
2006	1,4056
2007	1,1593
2008	1,5218
2009	1,4873
2010	1,5376
2011	1,8889
2012	1,7776
2013	2,1304
2014	2,3269
2015	2,9181
2016	3,5192

Source: CBRT, 2017. Indicative Exchange Rates Announced by the Central Bank of Turkey Bulletin No: 2016/249 (Avaliable at: http://www.tcmb.gov.tr/kurlar/201612/30122016.xml)
*: 6 zeros were removed from TL by January 2005.

3. Results and Discussion

3.1. Agricultural Subsidies in Turkey

Agricultural policies in Turkey are based upon subsidy policies. Characteristics of these implementations are to be supportive in domestic markets, and protective in foreign markets (MFAL, 2009).

Premium (deficiency) payments within agricultural subsidies first started in 1993 towards unseeded cotton. The purpose of premium payments is providing reasonably priced raw material to the industry while protecting producers. Besides Turkey, premium payments are applied in many developed and developing countries in the world.

According to article 19 from number 5488 of Agricultural Law, an increase in agricultural production is aimed at with premium payments (MFAL, 2005). Premium payment is a tool that is effective on regulating producer income, agricultural production, production quality, and productivity without effecting the market prices.

Premium payments in Turkey are applied to cotton (unseeded), sunflower, soybean, canola, safflower, corn, olive oil, tea, wheat (and other cereals), paddy and legumes. Within premium payments, 2,6 billion TL was paid in 2013. Among premium payments, cotton took first place with a share of 36%. The share distribution of other products were as follows; sunflower was 10%, soybean was 1%, canola and safflower were 1%, corn was 7%, olive oil was 2%, tea was 5%, wheat was 30%, other cereals were 3%, paddy was 3%, and legumes were 1% (MFAL, 2013).

According to data of the MFAL, the total agricultural subsidy amount was 11,3 billion TL, and among this value, area based subsidies, premium subsidies, and husbandry subsidies took a share of 78,38% from the total amount.

3.1.1. Subsidy Policies for Cotton in Turkey

Agricultural subsidies in Turkey are based on subsidy buying prices and policies. There are 3 different subsidy practices towards unseeded cotton in Turkey. These are;

1. Premium (deficiency) payment
2. Fuel and fertiliser subsidies
3. Organic agriculture subsidy

Premium (deficiency) payment: Agricultural subsidy policies for cotton were based on support purchases that were from the base price until 1993. In this method, cotton sales cooperatives were buying the cotton (unseeded) on behalf of the government from the base price that was determined at harvest season. Premium payment for cotton was applied for the first time in the term of 1993/94 with the cabinet's decision. The purposes of this system were; maintaining the production by providing prices to producers that were over the global

level, providing raw materials to industries from domestic resources at the level of global market prices, registering the enterprises, providing agricultural registration, and inventory holding (Özüdoğru, 2005).

While the principle of the support purchase system is buying the cotton from base price by intervening the market; the principle of premium payment is making premium payments per product unit based on the target price that was determined before, without intervening the market. In other words, the difference of premium payment is supporting the producers without intervening the market in the frame of free market economy rules (Özüdoğru, 2005). Premium payment price for unseeded cotton was 0,75 TL/kg in 2016 (BKK, 2016).

Cotton subsidies have an important place in premium payments. Subsidy unit prices between 2001 and 2016 are shown in Table 2.

Table 2: Cotton Subsidies in Turkey Between 2001 and 2016

Years	Premium Payment (TL/Kg)	Fuel (Diesel) Subsidy (TL/da)	Fertilizer Subsidy (TL/da)
2001	0,070 + %10 Certification Difference= 0,077		
2002	0,085 + %10 Certification Difference = 0,0935		
2003	0,090 + %10 Certification Difference = 0,099		
2004	0,19 + %20 Certification Difference = 0,228		
2005	0,267 + %20 Certification Difference = 0,320	4,5	3,0
2006	0,290 + %20 Certification Difference = 0,348		
2007	0,290 + %20 Certification Difference = 0,348	5,4	3,0
2008	0,270+%20 Certification Difference = 0,324	5,4	5,4
2009	0,350+%20 Certification Difference = 0,420	5,4	5,5
2010	0,350+%20 Certification Difference = 0,420	5,5	5,5
2011	0,350+%20 Certification Difference = 0,420	6,0	6,0
2012	Certificated = 0.46	7,0	7,0
2013	Certificated = 0.50	7,0	7,0
2014	Certificated = 0.55	7,5	7,5
2015	Certificated = 0,65	7,9	8,25
2016	Certificated = 0,75	11,00	

Source: Anonymous (2016). 2015 Yılı Pamuk Raporu. T.C. Gümrük ve Ticaret Bak. Kooperatifçilik Genel Müdürlüğü Yayınları. 35s.
(Avaliable at: http://koop.gtb.gov.tr/data/56e95b3a1a79f5b210d9176f/2015%20Pamuk%20Raporu.pdf, date of access:30.05.2017)

Fuel and Fertiliser Subsidies: Cotton producers are getting several subsidies such as fuel (diesel), fertiliser, and soil analysis depending on the size of their production area that is registered on the Farmer Register System (FRS). Fuel and fertiliser subsides were 11 TL/da in 2016 (BKK, 2016).

Organic Agriculture Subsidy: Farmers who conduct organic farming are getting subsidies to contribute to agricultural production without harming the health of nature, humans, or animals. In order to get the organic agriculture subsidy, farmers should be registered on the FRS and also have been conducting organic farming for at least one year. Organic productions within the organic agriculture subsidy program were divided into 4 groups in 2016, and cotton took place in the 3rd group. The organic agriculture subsidy unit price for cotton was 30 TL/da by 2016 (BKK, 2016).

3.1.2. Producers' View of Cotton Subsidies

Cotton producers' opinions about subsidies were asked for within the study. Approximately 75% of the producers stated that subsidy unit prices were low (Table 3).

Table 3 Producers' Opinions About Cotton Subsidies

Criteria	Frequency	Ratio (%)
Unit price is insufficient	11	8,09
Unit price is low	101	74,26
Unit price is at a normal level	6	4,41
Unit price is at a good level	18	13,24
Total	136	100,00

The premium subsidy unit price for cotton was 0,65 TL/kg in 2015, and this number was 0,75 TL/kg with a 15,38% increase in 2016. In terms of fuel and fertilizer subsidy, it was 16 TL/da in 2015 and decreased to 11 TL/da in 2016. Farmers stated a highly negative

opinion about this decrease, because fuel and fertiliser costs are such important expenses in cotton production.

3.2. Cost analysis in cotton production

The amount of inputs that were being used in the research area to produce 529,29 kg/da of unseeded cotton (the average amount from unit area) were; 2,62 kg of seed, 64,88 kg of fertiliser, 0,85 L of pesticide, 40,49 L of fuel (diesel), 641,71 kw of electricity, and 2,67 man power. The cost items of cotton production were given in Table 4. These items were divided into 3 groups; small enterprises, large enterprises, and enterprise average.

Table 4: Cotton Production Cost Items per Unit Area (da)

	(TL/da)		
Operations	< 100 da	>100 da	Average
Soil Preparation	67,63	67,38	67,44
Planting	8,88	9,03	9,00
Seed	27,12	25,77	26,08
Care Works			
Thinning and weeding (Hand)	65,56	65,07	65,19
Plowing and weeding (Machine)	17,94	19,05	18,79
Fertiliser Cost (*)	87,38	83,86	84,68
Fertilisation Cost	14,89	14,21	14,37
Pesticide Cost (**)	28,85	30,05	29,77
Pesticide Application Cost	32,54	34,59	34,12
Irrigation Labor Cost	59,66	49,18	51,62
Irrigation Cost	46,69	25,32	30,30
Fuel Cost for Irrigation	19,73	13,84	15,21
Electricty Cost for Irrigation	119,76	164,91	154,39
Harvest (Machinery+Labor)	152,61	132,43	137,13
Marketing Cost	34,51	30,84	31,69
Total	783,75	765,53	769,78
Variable Capital Interest (%2)	15,68	15,31	15,40

Variable Costs	799,43	780,84	785,18
General Administrative Expenses	23,98	23,43	23,56
Product Insurance	10,00	10,00	10,00
Ground Rent	254,33	253,63	253,80
Fixed Costs	288,31	287,06	287,36
Production Costs	1087,74	1067,90	1072,53
Productivity (kg/da)	542,97	525,14	529,29
Cost (TL/kg)	2,00	2,03	2,03

(*): Including bottom fertilizer
(**): Including pesticide application before planting

The distribution of cost items in cotton production was shown in Table 5. According to the table, the share of variable costs in total cotton production cost was 73,21%, and the share of fixed cost in total cost was 26,79%.

Table 5: Cost Items Distribution in Cotton Production (%)

Operations	**(%)**		
	< 100 da	>100 da	Average
Soil Preparation	6,22	6,31	6,29
Planting	0,82	0,85	0,84
Seed	2,49	2,41	2,43
Care Works			
Thinning and weeding (Hand)	6,03	6,09	6,08
Plowing and weeding (Machine)	1,65	1,78	1,75
Fertiliser Cost	8,03	7,85	7,90
Fertilisation Cost	1,37	1,33	1,34
Pesticide Cost	2,65	2,81	2,78
Pesticide Application Cost	2,99	3,24	3,18
Irrigation Labor Cost	5,48	4,61	4,81
Irrigation Cost	4,29	2,37	2,83
Fuel Cost for Irrigation	1,81	1,30	1,42
Electricty Cost for Irrigation	11,01	15,44	14,39

Harvest (Machinery)	14,03	12,40	12,79
Marketing Cost	3,17	2,89	2,95
Total	72,05	71,69	71,77
Variable Capital Interest	1,44	1,43	1,44
Variable Costs	73,49	73,12	73,21
General Administrative Expenses	2,20	2,19	2,20
Product Insurance	0,92	0,94	0,93
Land Rent	23,38	23,75	23,66
Fixed Costs	26,51	26,88	26,79
Production Costs	100,00	100,00	100,00

Among the variable costs, electricity takes the first place, and this is followed by harvest (machinery).

3.3. Gross Profit Analysis in Cotton Production

Gross profit is one of the important items in agricultural economics. Gross profits indicates profitability level of a product for producers, also it is the first criteria in business planning (product selection). There were two factors that were examined in gross profit calculations, the situation that whether using of agricultural subsidies in cotton production or not. Economic indicators in cotton production were given below, excluding the subsidies (Table 6) and including the subsidies (Table 7).

Table 6: Economic Activity Results in Cotton Production (Excluding the Subsidies)

	(TL/da)		
Criterions	< 100 da	>100 da	Average
Productivity (kg/da)	542,97	525,14	529,29
Sale Price (TL/kg)	1,70	1,76	1,74
Gross Output Value (TL/da)	923,05	924,25	920,96
Variable Costs (TL/da)	799,43	780,84	785,18
Fixed Costs (TL/da)	288,31	287,06	287,36
Production Costs (TL/da)	1087,74	1067,90	1072,53

Unit Cost (TL/kg)	2,00	2,03	2,03
Gross Profit (TL/da)	123,62	143,41	135,79
Net Profit (TL/da)	-164,69	-143,65	-151,57
Relative Profit	0,85	0,87	0,86

In the table 6, productivity per unit area was 17 kg more in the small sized enterprises (<100 da) than the large sized enterprises (>100 da). However, average sale price was 0,06 TL more in the large sized enterprises than the small sized enterprises. In this respect, there was no difference in enterprises'gross output values.

Gross income (difference between gross output value and variable costs) was 135,79 TL in the enterprises that weren't usuing agricultural subsidies. Net profits were found negative in both small sized and large sized enterprises.

Table 7: Economic Activity Results in Cotton Production (Including the Subsidies)

	(TL/da)		
Criterions	< 100 da	>100 da	Average
Productivity (kg/da)	542,97	525,14	529,29
Sale Price (TL/kg)	1,70	1,76	1,74
Gross Output Value (TL/da)	923,05	924,25	920,96
Area Based Subsidies (Fuel and Fertilizer-TL/da)	11,00	11,00	11,00
Premium Subsidy (TL/kg; 0,75 TL*Productivity value)	407,23	393,86	396,97
Total Cotton Income	1341,28	1329,10	1328,93
Variable Costs (TL/da)	799,43	780,84	785,18
Fixed Costs (TL/da)	288,31	287,06	287,36
Production Costs (TL/da)	1087,74	1067,90	1072,53
Unit Cost (TL/kg)	2,00	2,03	2,03
Gross Profit (TL/da)	541,85	548,26	543,76
Net Profit (TL/da)	253,54	261,21	256,40
Relative Profit	1,23	1,24	1,24

The average gross profit value in the enterprises which were utilizing agricultural subsidies was found 543,76 TL which is four times more than the ones which weren't

utilizing agricultural subsidies. This situation provides positive outcome in net profit in the enterprises which were utilizing agricultural subsidies comparing to the ones which weren't. These values indicate that agricultural subsidies help to decrease agricultural production costs, they also contribute to increase product profitability. The relative profit in the enterprises which weren't utilizing agricultural subsidies is below 1, yet this value increases 0,38 unit when subsidies are included.

The analysis proved the importance of subsidies in cotton production. The most important action that could be taken to improve the cotton production amount in Turkey and the Hatay province is increasing the subsidy amounts towards cotton considering the International Trade Union's rules.

In another study, unseeded cotton cost per kg was calculated as 0,784 US$ for 2012, and was 0,611 US$ for 2013. The subsidy amount for per kg was 0,302 US$ for 2012, and was 0,27 US$ for 2013. Cost coverage ratios of subsidies for these 2 years were calculated as 38,11% and 44,66% (Semerci, 2016; Bugem, 2016).

Table 8: Ratios of Subsidies-Costs in Cotton Production in Turkey

Product	Cost (US$/Kg)		Subsidy (US$/Kg)		Subsidy / Cost (%)	
	2012 Year	2013 Year	2012 Year	2013 Year	2012 Year	2013 Year
Cotton	0.784	0.611	0.302	0.270	38.11	44.66

Source: MFAL. 2015. Supports Costs Ratios-2. Agricultural Data. General Directorate for Agricultural Researches and Policies. Directorate of Agricultural Economy and Policy Development Institute. March. Ankara. p.6 (available at:http://www.tarim.gov.tr/Belgeler/SagMenuVeriler/Tarimsal_Veriler.pdf)

Calculation details by 2013 in unseeded cotton production in Turkey for 499 kg of product per unit area, were given in Table 9.

Table 9: Subsidy / Cost Ratios (%) for Cotton Production in Turkey in 2013.

Products	Average Yield (Kg/da)	Cost (US$/Kg)	Price (US$/Kg)	Subsidy Amounts (US$/Kg)						Year 2013 Subsidy / Cost (%)
				Premium	Soil Analysis	Certified Seed	Fertiliser	Diesel Fuel	Total	
Cotton	499	0.614	0.633	0.258	0.002	*	0.007	0.007	0.274	44.66

(*): Sufficient data has not been reached.

Source: MFAL. 2015. Supports Costs Ratios-2. Agricultural Data. General Directorate for Agricultural Researches and Policies. Directorate of Agricultural Economy and Policy Development Institute. March. Ankara. p.5 (http://www.tarim.gov.tr/Belgeler/SagMenuVeriler/Tarimsal_Veriler.pdf)

The research findings of this study are similar to other studies that were carried out before about the same topic. Agricultural subsidies help to decrease product costs, and they also increase producers' income levels. These contributions could be seen clearly in cotton production. There are intensive input usage especially in cotton and paddy production in Turkey. As a part of area based subsidies (diesel fuel, fertilizer, and soil analysis subsidies), subsidy amount was 11 TL/da in cotton production for 2016, and this amount had increased to 40 TL/da for 2017. The highest contribution to producer income is by premium subsidy that is paid for product per kg which was 0,75 TL/kg for 2016, and it had increased to 0,80 TL/kg for 2017.

3.4. Total Factor Productivity for Cotton Enterprises

The formulas that were used within the study in order to calculate the Total Factor Productivity (TFP) were given below (Mc Connell and Dillon, 1997);

Gross TFP = Total Gross Output Value$^{(*)}$ / Total Production Cost = 1.328,93 TL/1.072,53 = 1,24

and

Net TFP = Total Net Gaining / Total Production Cost = 256,40 TL / 1.072 TL = 0,24

4. Conclusion and Recommendations

Worldwide, cotton is grown in an area of around 36 million ha, and it has an important place among other fiber plants. Although Turkey is 8th in the cotton production of the world, Turkey imports as much cotton as it produces.

In this study, cotton production in the province of Hatay was examined based on gross profit and costs. Also, effects of subsidies on cotton producers' incomes and on costs were examined. Parent material of the study was gathered from 136 cotton enterprises which were determined with a 5% margin of error and at 95% confidence interval. Enterprises were divided into two groups (<100 da and >100 da). Among the enterprises which were examined,

cotton took first place in the production pattern with a ratio of 38,20%, and the average cotton production area size was found as 108 da.

In the enterprises that were examined, 7.767 tons of unseeded cotton were produced in a 14.674 da area by 2016. In order to obtain the average product amount (529,3 kg) from the unit area; 2,6 kg of seed, 64,9 kg of fertiliser, 0,85 L of pesticide, 40,5 L of diesel fuel, 641,7 kw of electricity, and 2,7 man power were being used.

Cotton production cost was found as 2,0 TL/kg in the small enterprises, and was found as 2,03 TL/kg in the large enterprises. Excluding the ground rent, energy cost was found as the highest expense among the other cost items. The energy cost was found as 170 TL in order to obtain water to irrigate the unit area. Likewise, 85% of the enterprises were using either diesel fuel or electricity to pump water from the ground to irrigate their products. Therefore, providing economic methods to obtain irrigation water by conducting infrastructure works, would contribute to decreasing the cotton production costs immensely. The other important cost items were; harvesting, fertiliser, soil preparation, and weeding.

Economic data of the enterprises were found as; subsidy excluded, the gross profit per unit area was 135,79 TL, the net profit was -151,57 TL, and the relative profit was 0,86 TL. Subsidy included, the gross profit per unit area was 543,76 TL, the net profit was 256,40 TL, and the relative profit was 1,24 TL. These results indicate that cotton producers' profits consist of subsidies. In other words, subsidies are essential in the production of cotton.

In conclusion, it is necessary to take precautions to reduce energy costs like fuel and electricity which are used commonly to pump out irrigation water. Producer organizations should take more active roles in finding input, and in product marketing. Technical training activities towards cotton production in the region should be focused on. In order to increase cotton production in Turkey and in the Hatay province, the biggest and most important step that could be taken is increasing the amount of premium subsidy payments towards cotton production in the frame of the WTO's rules.

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