Economic Analysis of Cotton Production in Bhadradri Kothagudem District of Telangana

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ABSTRACT: The study focused on the economics of cotton production in Telangana's Bhadradri Kothagudem district. So, Bhadradri Kothagudem district was one of the largest cotton cultivating district in Telangana along with diversified cotton cultivation The survey was conducted in the year 2019-20. The cost of cultivation or production of any crop assists farmers in determining the profitability of the harvest and, as a result, the need to adjust cropping patterns. The data was analyzed using descriptive statistics, comprising mean, percentage, ratio, and the Cost-A, Cost-B, and Cost-C cost concepts. As a result, the current study has calculated the cost and returns of cotton cultivation. Cotton production had an extremely high total cost. 94,159.47/per hectare. The overall net yield per hectare has been estimated to be around Rs. 30,454.03/per hectare. 124,613.50/per hectare was found for the cotton cultivation. The cost concepts and farm efficiency measurements were developed, and they revealed a significant and direct relationship with farm size and profitability. A net return analysis was also conducted for different types of farms, resulting indicated varying trends. The research also showed that as acre size increased, yield, gross return, and net return per acre increased. There were significant differences in these characteristics among farms of marginal and medium size. Differences in cost per acre across various size classes were reflected in yield per acre differences. There were no significant differences in cotton selling prices among the various farm sizes.

Keywords: Economic Analysis, Cost and returns, Gross return, Net profit, cotton production.

INTRODUCTION

Cotton is one of India's most important fibre and cash crops, and it is vital to the country's industrial and agricultural economy. India has overtaken China as the world's second largest producer of cotton and first in terms of total area under crop production. Cotton sowing, temporal conflicts in preceding crop harvesting, and interactions due to residual effects on successive crops all affect cotton management in complex farming systems (Byerlee *et al*., 1986). According to Iqbal *et al*. (2001), timely availability of inputs like seeds, fertilizers, and pesticides can boost crop output. According to Batterham (2000), cotton production is still insufficient to meet demand. Cotton cultivation costs have a significant part in determining the profitability of the crop. It also has an impact on the livelihoods of more than 6 million cotton farmers, the majority of whom are small and marginal. Cotton growers in India are becoming increasingly dissatisfied as income have decreased over the years. Cotton cultivation costs have increased in several studies at various levels (Shende and Thakare 2011; Balaji and Kumar, 2016; Narayanamoorthy, 2013; Suresh *et al.,* 2014; Matode *et al*., 2015). The increasing cost of cultivation has major consequences and will have an impact on cotton production's long-term sustainability. Hence, there is a need for an in-depth analysis to find out the major factors responsible for the escalation in cultivation costs. The farming community requires current information in order to increase cotton yield. This provides a full analysis as well as recommendations based on the study's findings.

The world's foremost country for cotton textile domestication and manufacturing. Cotton is also known as "The King of Fibers" or "The White Gold". It is a widely farmed commercial crop all over the world, but it is especially important in India. After China, India is the world's second-largest cotton producer, accounting for around 18% of global cotton production. A net return analysis was also conducted for different types of farms, resulting indicated varying trends. Several studies have found that adopting Bt cotton has positive social and economic benefits, including poverty reduction and rural development (Subramanian and Qaim, 2010), higher yield and lower pesticide use (Krishna and Qaim, 2012), and an increase in positive health externalities (Kouser and Qaim, 2011), among many others. It received the distinction of possessing the world's biggest cotton area under cultivation, having 12.2 million hectares accounting for around 25% of the world's cotton cultivation area. Despite the fact that the

yield per hectare is the lowest in comparison to the global average, it has shown a promising potential to reach world average output levels in the near future over the last two years (Clive, 2013). Cotton production in the country has increased significantly over the years.

Cotton contributes around 44% of the world's fibre and 10% of the world's oil products. The increase in production in the area in 2015-16 is attributed to an increase in the number of people working in the area. Cotton crop output in 2015-16 was 358 kg/ha, down from 360 kg/ha in 2014-15, a 0.56 percent reduction from the previous year. Area, productivity, and production crops from 2001-02 to 2015-16 (Anonymous, 2016).

METHODOLOGY

The findings of the study were collected through personal interviews with chosen cotton growers in the study area. An elaborate schedule was designed to acquire data from the sample farmers, keeping in mind the study's objectives and nature. The research was carried out in the Telangana State district of Bhadradri Kothagudem since the cotton crop is one of the most important crops in the district during the Kharif season. So, Bhadradri Kothagudem district was one of the largest cotton cultivating district in Telangana along with diversified cotton cultivation. The next move was to select respondents from a complete list of farmers from the villages chosen together with their size of holdings were obtained with the aid of specialists in the subject matter. All the selected district divisions, along with the status of cotton cultivating area and production, will be prepared. Out of these divisions, one division having a more substantial area under cotton and diversified cultivation has selected. Furthermore, all the blocks/mandals selected under the division has been listed, and from among them, two blocks/mandals has selected with the most significant area under cotton cultivation. Using probability proportional to size sampling, 60 farmers are randomly assigned from every block, and therefore, 120 responders would be the maximum sample size.

Cost Concepts Employed. The present research is based primarily on primary field data acquired from chosen farm families in Telangana. On better assessment, the cost concepts of Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, and Cost C2 were used in the analysis, as they are by the Commission for Agriculture Costs and Prices. In this study, cost ideas are utilised to estimate the average cost of production, farm business income, family labour income, net income, gross income, and the input items included under each cost category, as well as profitability from cotton crop cultivation. The following concepts were also considered in this research:

Cost A1: value of human labour plus attached labour + value of owned and hired bullock labour + charges on owned and hired machinery + value of seed (both farm produced and purchased) + value of pesticides, insecticides + value of owned and purchased manures + value of chemical fertilizers + depreciation on implements, equipments, and farm buildings + irrigation charges (payments made for canal water, pond water, etc.) + Land revenue, cess, and other taxes + Interest on work + (Artisans etc.).Cost A2: cost A1+rent paid for leased land

Cost B1: cost B1+intrest on capital assets (excluding land)

Cost B2: cost B1+rental value of own land

Cost C1: cost C1+imputed value of family labour

Cost C2: cost B2+imputed value of family labour.

Farm Business Measures. Gross income, net income, farm business income, family labour income, and farm investment income are the farm business measures. They are used in the study to arrive at the gains to the farmers as well as different social and size categories of farmers. They are calculated using the standard formulae as follows.

— Gross income: Value of total output (Main + by - product)

— Net income/Profit: Gross income – Cost C2

— Farm business income: Gross income – Cost A1 or Cost A2

— Family labour income: Gross income – Cost B2

— Family investment income: Farm business income – imputed value of family

— Labour Benefit Cost Ratio = Net returns/Total cost of cultivation

RESULTS AND DISCUSSION

Some inputs (raw materials) are turned into outputs during the production process. Seed, manures, fertilizer, water, and plant protection elements are now all turned into various outputs in agricultural production. Throughout the production process of cotton, the costs involved in the production of these materials can be divided broadly in two groups, i.e. operating costs and overhead costs. Operating costs, known as variable costs or labour costs which comprising of those inputs which vary with production costs such as seeds, insecticides, plant protection measures, manures, fertilizers, human labour, machine labour, bullock labour, labour interest, etc. Although the overhead costs, also known as fixed costs, include equipment and machinery depreciation, rental costs. Further more, operating costs can be divided into two groups, i.e., labour costs such as human labour costs, bullock labour costs, machine labour costs, etc., and material costs such as seed costs, fertilizer costs, irrigation charges, plant chemicals costs, etc.

A complete data analysis related to the cost of different items used in the production process was conducted in order to gain a more in-depth understanding of various cost components in cotton cultivation, and the results of the study are presented in Table 1.

It may be inferred from the table that the overall cost of cotton cultivation was calculated at Rs. 94159.47 per hectare. The variable cost per unit per hectare was Rs. 61791.80, or 65.35 percent of the total cost. The fixed cost per hectare amounted Rs. 32758.89, contributing about 34.65% of the total cotton production cost. The overall price of cotton cultivation was estimated to be Rs. 94550.69, Rs. 93507.95, Rs. 94495.88, and Rs.

964083.35 for marginal, small, medium, and large farms, respectively, across all farm sizes. For marginal, low, medium, and large farms, variable costs accounted for 63.10 percent of total costs, 63.92 percent, 64.65 percent, and 62.87 percent, respectively. On marginal, low, medium, and big farms, overhead expenditures accounted for 34.65 percent, 34.45 percent, 34.42 percent, and 36.86 percent, respectively. Due to a lack of resources, small farms compensated for their lower usage of machinery by depending more on family labour. Despite the profit margin, farmers faced the issue of high input costs, particularly fertilizer, enhanced seed, and tainted chemicals. Farmers should establish cooperatives to direct resources for purchasing inputs such as herbicides and pesticides, according to the research (Adeniji and Jirgi 2010).

Costs and returns in cultivation of cotton

Cost of cultivation: Some inputs (raw materials) are turned into outputs during the manufacturing process. Seed, manures, fertilizer, water, and plant protection elements are all changed into different outputs during the agricultural production process. The cost of

procuring these inputs in the cotton production process can be separated into two categories: operational cost and overhead cost. Operational cost, also known as variable cost or working cost, consists of inputs that vary with the level of production, such as seed, manures, fertilizers, plant protection measures, human labour, bullock labour, machine labour, interest on working capital, and so on, whereas overhead cost, also known as fixed cost, consists of depreciation on implements and machineries, rental value of owned land, and so on.The operational costs are further separated into two categories: labour costs such as human labour, bullock labour, machine labour, and material costs such as seed, fertilizers, irrigation charges, and plant protection chemicals costs, among many others.

A detailed analysis of data related to the cost of different goods used in the process of making cotton were carried out in order to gain a better understanding of the various cost components in cotton cultivation, and the results of the data analysis are shown in Table 1.

Table 1: Cost of cultivation of cotton (Rs./hectare)

Particulars		Farm Size Group				Overall
		Marginal	Small	Medium	Large	
A.	Operational Cost					
a.	Labour cost					
1.	Human Labour	25020.37 (26.46)	25969.34 (27.77)	25560.43 (27.05)	26119.96 (27.76)	25667.52 (27.26)
2.	Family labour	2307.35 (2.44)	1712.74 (1.83)	1064.59 (1.13)	437.07 (0.46)	1380.44 (1.47)
3.	Animal labour	6097.86 (6.45)	5890.62 (6.30)	5799.72 (6.14)	5679.97 (6.04)	5867.04 (6.23)
4.	Machine labour	7305.28 (7.73)	7180.62 (7.68)	9045.54 (9.57)	6697.34 (7.12)	7557.20 (8.03)
b.	Material cost					
1.	Seed	5124.94 (5.42)	4455.71 (4.77)	4379.91 (4.64)	4548.23 (4.83)	4627.20 (4.91)
2.	Fertilizer and manures	7220.70 (7.64)	7220.05 (7.72)	7184.00 (7.60)	7056.53 (7.50)	7170.32 (7.62)
3.	Insecticides	7131.40 (7.54)	7354.06 (7.86)	7326.08 (7.75)	7311.12 (7.77)	7280.67 (7.73)
4.	Irrigation charges	99.11 (0.10)	26.42 (0.03)	89.29 (0.09)	79.30 (0.08)	73.53 (0.08)
5.	Total working capital	57999.66 (61.34)	58096.82 (62.13)	59384.97 (62.84)	57492.45 (61.11)	58243.47 (61.86)
6.	Interest on working capital	1484.79 (1.57)	1487.28 (1.59)	1520.26 (1.61)	1471.81 (1.56)	1491.03 (1.58)
	Total variable cost	61791.80 (65.35)	61296.84 (65.55)	61969.82 (65.58)	59401.33 (63.14)	61114.95 (64.91)
B.	Overhead cost					
1.	Rental Value of owned land	28675.33 (30.33)	27382.65 (29.28)	27477.2 (29.08)	28930.24 (30.75)	28116.36 (29.86)
2.	Rent paid for leased in -land	1346.0 (1.42)	1455.0 (1.56)	1520.50 (1.61)	1562.24 (1.66)	1470.94 (1.56)
3.	Land revenue, taxes, cesses	274.82 (0.29)	287.50 (0.31)	292.20 (0.31)	295.30 (0.31)	287.45 (0.31)
4.	Depreciation on implements and farm building	624.02 (0.66)	1278.96 (1.37)	1411.61 (1.49)	1947.82 (2.07)	1315.60 (1.40)
5.	Interest on fixed capital	1838.72 (1.94)	1807.00 (1.93)	1824.56 (1.93)	1946.42 (2.07)	1854.17 (1.97)
	Total overhead cost	32758.89 (34.65)	32211.11 (34.45)	32526.06 (34.42)	34682.02 (36.86)	33044.52 (35.06)
	Total cost	94550.69 (100.00)	93507.95 (100.00)	94495.88 (100.00)	94083.35 (100.00)	94159.47 (100.00)

Figures in the parentheses indicate percentage value of total cost

The overall cost of cotton cultivation was estimated at Rs. 94159.47 per hectare, as shown in the Table. On average, the variable cost per hectare was Rs. 61791.80, accounting for 65.35 percent of the overall cost. The fixed cost per hectare came to Rs. 32758.89, accounting for 34.65% of the total cost of cotton cultivation.

On marginal, small, medium, and large farms, the total cost of cotton cultivation was found to be Rs. 94550.69, Rs. 93507.95, Rs. 94495.88, and Rs. 964083.35, respectively, across all farm size groups. On marginal, small, medium, and large farms, variable costs accounted for 63.10 percent, 63.92 percent, 64.65 percent, and 62.87 percent of total costs, respectively. On marginal, small, medium, and large farms, overhead costs accounted for 34.65 percent, 34.45 percent, 34.42 percent, and 36.86 percent, respectively.

The results clearly show that the total cost of cultivation was higher in the case of marginal farmers. This could be due to overuse and higher input costs because they purchase inputs from local markets. However, the other component of overall cost, overhead, did not show any consistent pattern as farm size increased.

The table also showed that among several components of variable cost, human labour contributed for the biggest percentage (27.26%) of the overall cost, followed by machinery charges (8.03%), insecticides costs (7.73%), fertilizers and manure costs (7.62%) in the cost of cultivation. Animal labour contributed for 6.25 percent of total operating costs, whereas seed accounted for 4.93 percent. Other less significant cost factors of operational cost were found to be family labour, irrigation, and manures.

The capital value of owned land was found to be the most important fixed cost item, accounting for 29.85% of the overall cost, followed by interest on fixed capital (1.97 per cent). When different cost components were compared across farms of different sizes, it was found that the cost of family labour declined as farm size increased, but the cost of machine labour continued to increase. It was mostly due to the fact that on larger farms, less human labour was compensated by more machine labour. In comparison to large farms, small farms used more family labour, according with analysis. Due to a lack of resources, small farms compensated for their lower usage of machinery by depending more on family labour.

Cost of cultivation in terms of cost concepts: Table 2 shows the findings of a study of the various cost concepts used during the analysis of cotton.

The cost A1 and cost A2 for all farm sizes were found to be Rs. 61337.56 and Rs. 62808.50 per hectare, respectively, as shown in Table 2. The costs B1 and B2 per hectare were calculated to be Rs. 63191.74 and Rs. 92779.03, respectively. The costs C1 and C2 per hectare were calculated to be Rs. 64572.18 and Rs. 94159.47, respectively. The prices of cotton per hectare on diverse farms fluctuated a lot.

B-C ratio in terms of cost concepts: Cotton cost – benefit ratios were calculated for several categories of sample farms, as shown in Table 3.

Table 2: Cost of cultivation in terms of cost concepts (Rs. /hectare).

Items	Marginal	Small	Medium	large	Over all
Cost A$_1$	60383.28	61150.56	62609.03	61207.38	61337.56
Cost A$_2$	61729.28	62605.56	64129.53	62769.62	62808.50
Cost B$_1$	62222.00	62957.56	64433.59	63153.80	63191.74
Cost B$_2$	92243.33	91795.21	93431.29	93646.28	92779.03
Cost C$_1$	64529.36	64670.30	65498.18	63590.87	64572.18
Cost C$_2$	94550.69	93507.95	94495.88	94083.35	94159.47
Gross return	139842.86	146014.10	132058.58	138368.35	139128.73

Table 3: Farm size-wise B-C ratio in terms of cost concepts.

B:C ratio over	Marginal	Small	Medium	large	Overall
Cost A1	1.96	1.87	2.11	2.19	2.03
Cost A2	1.91	1.83	2.06	2.14	1.98
Cost B1	1.90	1.82	2.05	2.12	1.97
Cost B2	1.28	1.25	1.41	1.43	1.34
Cost C1	1.83	1.77	2.02	2.11	1.93
Cost C2	1.25	1.22	1.40	1.43	1.32

The benefit-cost ratio calculates the return on every unit of investment in cotton production. Various cost items including such cost A1, cost A2, cost B1, cost B2, cost C1, and cost C2 were used to compute the benefit cost ratio. From CostA1 to CostC2, the entire B:C ratio changes from 2.03 to 1.32, respectively. On the basis of various costs, it ranged from 1.93 to 1.25 for marginal farms, 1.87 to 1.22 for small farms, 2.11 to 1.40 for medium farms, and 2.19 to 1.43 for large farms.

Returns from cotton cultivation: Productivity and cost of production of cotton were computed for different categories farms under investigation and returns on the basis of farm business were shown in Table 4.

Cotton productivity was 27.8 quintal per hectare, according to the table. It was greater on medium farms (29.48 quintal per hectare), while it was determined to be 27.15 and 25.44 quintal per hectare on marginal and small farms, respectively.

At a market price of Rs. 4350 per quintal, the average gross return on cotton was estimated. Cotton's overall gross return was estimated to be Rs.124613.5. Overall farm business income, family labour income, and farm investment income per hectare were calculated to be Rs 61805.00, Rs 31834.47, and Rs 60424.56 per hectare.

Low seed cotton prices, insect and disease infestations, insufficient funds, high input costs, and insufficient extension agents were also recognised as production bottlenecks in the study. Farmers should create cooperative societies to gain access to financing, and they should be trained by government and non-governmental organisations on the most effective pesticide application methods in the study area, according to the researchers (Alam *et al.*, 2013).

It is assumed that, on average, the net return increases as the size of the farms grows. According to Qaim (2003); Rao and Dev (2009), the pro-Bt camp's narrative, Bt technology promises yield benefits.

Returns from cotton cultivation in terms of cost concepts: There turns over different costs of cotton we real so computed for different categories of sample farms and presented in Table 5.

When it comes to net profits per hectare, for all farm size categories, cost A1 and cost A2 were found to be Rs. 63275.94 and Rs. 61805.00, respectively. Furthermore, costs B1 and B2 were estimated. Rs. 61421.76 per hectare and Rs. 31834.47 per hectare, respectively. The costs C1 and C2 per hectare were estimated to be Rs. 64572.18 and Rs. 30454.03, respectively. A net return analysis was also conducted for various types of farms, which revealed fluctuating trends. A net return analysis was also conducted for various types of farms, which revealed fluctuating trends. These results were more or less similar to (Odedokun *et al.*, 2015).

Table 4: Yield and income from cotton cultivation.

Yield and Income			Marginal	Small	Medium	Large	Overall
Cost of cultivation (Rs. /ha)			94550.69	93507.95	94495.88	94083.35	94159.47
Yield (q/ha)			27.15	25.44	29.48	29.15	27.80
Price (Rs. /q)			4350.00	4500.00	4480.00	4600.00	4482.50
Gross Returns (Rs/ha)			118102.50	114480.00	132070.4	134090.0	124613.50
Net Return (Rs. /ha)			23551.81	20972.05	37574.52	40006.65	30454.03
Farm business Income (Rs/ha)			56373.22	51874.44	67940.87	71320.38	61805.00
Family labour Income (Rs/ha)			25859.17	22684.79	38639.11	40443.72	31834.47
Farm investment Income(Rs/ha)			54065.86	50161.69	66876.27	70883.31	60424.56

Table 5: Returns over different costs on sample farms (Rs. /hectare).

Net return over	Marginal	small	medium	Large	Overall
Cost A1	57719.22	53329.44	69461.37	72882.62	63275.94
Cost A2	56373.22	51874.44	67940.87	71320.38	61805.00
Cost B1	55880.50	51522.44	67636.81	70936.20	61421.76
Cost B2	25859.17	22684.79	38639.11	40443.72	31834.47
Cost C1	64529.36	64670.30	65498.18	63590.87	64572.18
Cost C2	23551.81	20972.05	37574.52	40006.65	30454.03

CONCLUSION AND RECOMMENDATIONS

In cotton production, the study revealed a significant variation in expenditures between lower and higher size categories of farms. This resulted in lower levels of crop productivity in smaller size classes of farms as compared to greater size classes of farms. Due to a lack of financial resources, marginal and small farmers could not afford to invest further in the cultivation of this crop. Small farmers used to have the highest variable costs due to the cost of human labour, bullock labour, FYM, and pesticide expenditure, whereas semi-medium farmers had the lowest. Due to the rental value of land, midsize farmers had the highest share of fixed costs. Cotton is the most important crop in the research area, contributing for almost 40% of the gross cultivated area, followed by rice. Plant protection methods were widely used in the study region, and chemical fertilizers were used more frequently than organic manures. Cotton's overall cost of production was relatively high. A contribution of Rs. 93872.01/- per hectare was received.

Overall, it was estimated that the net return per hectare would be around Rs. 30741.49/-. Cotton farming yielded a total net income per hectare of Rs. 30741.49/- and a total gross revenue of Rs. 124613.5/- per hectare.

Cotton production was a viable enterprise in the research region, according to the results of cost of cultivation and net farm revenue analyses. Various policy initiatives and suggestions are given based on the preceding findings to help improve the rate of improvement in cotton production.

1. The government must establish a proper inputs delivery network by reactivating the farmers supply company, inputs supply agencies, and registered private actors. The private sector input voucher distribution programme would provide farmers with improving accessibility to inputs at affordable prices and at the right time.

2. A consistent and deliberate approach should be taken through an intensive research and extension service delivery programme for cotton production. As more innovation is given, the utilization of appropriate

recommended cotton production practices will increase.

3. Cotton production is a profitable business. As a result, agro-service agencies and the government should support the production of cotton lint, cotton seed, cotton seed oil, and cotton seed cake by providing input subsidies and price incentives.

4. Farmers should be effectively trained with the use of pesticides by the government and the private sector in order to effectively control pest and disease infestation on cotton farms. To reduce the use of fraudulent and adulterated chemicals, farmers should have access to high-quality, well-tested pesticides.

5. Farmers are encouraged to establish or join cooperative societies in order to have access to lending and borrowing facilities provided by government and other financial institutions.

6. Fertilizer, for instance, should be distributed at the correct time.

7. Cotton growers would gain through coordination between both the state, federal government, and donor institutions.

FUTURE SCOPE

Such type of research studies will help to prepare the government to establish a proper inputs delivery network by reactivating the farmer's inputs supply agencies, and registered private actors and also providing farmers effective training and guiding for efficient use of pesticides at proper time.

Conflict of interest. None.

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