



Economics and Constraints Analysis of Cotton in Nalgonda District of Telangana

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Abstract

The study was conducted from December to March, 2024–25 in the Nalgonda district, Telangana, India, to assess the economics of cotton cultivation in the district. Cotton is one of the most important commercial crops and plays a pivotal role in the income of rural households in the district. A sample of 60 farmers was selected using a simple random sampling technique without replacement, and data were collected through a personal interview method during 2024–25. The results revealed that the total cost of cotton cultivation was ₹ 84693 ha⁻¹, comprising ₹ 64586 ha⁻¹ (76.26%) as operational cost and ₹ 20107 ha⁻¹ (23.74%) as fixed cost. Among the various input costs, human labour was the major cost, ₹ 27021 ha⁻¹, followed by plant protection chemicals and fertilizer costs, ₹ 10082 ha⁻¹ and ₹ 9152 ha⁻¹, respectively. The average yield was 19.74 q ha⁻¹, and gross returns were found to be ₹ 149346 ha⁻¹. The B:C ratio was 1.76, which indicated that the cotton crop is profitable in the study area. The major constraints faced by cotton growers were the high wage rate of labour for cotton picking, infestation of the pink bollworm, and lack of awareness of the scientific method of cotton cultivation. Mechanised cotton picking reduces labour costs and increases net returns, emphasizing the need for state government incentives to support the mechanisation in cotton picking.

Keywords: Constraints, cotton, economics, Nalgonda district, Telangana

1. Introduction

Cotton is an important commercial crop cultivated for fibre, oil, and feed in tropical and subtropical regions globally (Nagrare et al., 2023). It is the most important fiber crop in the global textile industry, and the leading natural fiber in production and trade (Qin et al., 2023). Cotton is known as the White Gold and the King of fibers, and constitutes a fundamental raw material for the textile industry (Shabbir and Yaqoob, 2019). It is cultivated in more than seventy countries around the world. China, India, Brazil, the United States, and Australia were the major cotton-growing countries. India is the second largest producer of cotton, cultivated in an area of about 13.06 Mha, accounting for 21% of total global cotton production. However, India's productivity of 461 kg ha⁻¹ is low compared to the top cotton growing countries in the world (Anonymous, 2024c). It plays a major role in sustaining the livelihood of 6 million cotton farmers and 40–50 million people engaged in related activities such as cotton processing

& trade in the country (Anonymous, 2024b). Cotton also contributes significantly to the nation's foreign exchange earnings by exporting raw cotton and value-added finished products (Radhika and Kumari, 2015a). In India, cotton is cultivated across three distinct agro-ecological zones (North, Central, and South) with a production of 325.22 lakh bales and an average yield of 436.02 kg ha⁻¹ during the 2023–24. The central zone accounts for 50% of cotton production, predominantly under rainfed conditions, whereas the northern and southern zones contribute 15% and 30%, respectively (Anonymous, 2024a). India is the only country that grows all four species of cotton. *Gossypium arboreum* and *Gossypium herbaceum* (Asian cotton), *G. barbadense* (Egyptian cotton), and *G. hirsutum* (American upland cotton), along with their intra and interspecific hybrids on the commercial scale (Kumar et al., 2019). *Gossypium hirsutum* represents 88% of the hybrid cotton production in India, and all the current Bt cotton hybrids are from *G. hirsutum*. Gujarat, Maharashtra, Telangana, Rajasthan, Karnataka, and Andhra



Pradesh are the main cotton-growing states in the country. Telangana state ranks second in area (1.97 mha) and third in production (5.74 mt) among the major cotton growing states (Anonymous, 2023). The agriculture sector plays a vital role in the development of the state economy, with around 60% of the population relying on agriculture and allied activities as their primary source of income and livelihood (Bandumula et al., 2022; Guntukula, 2017). The cotton is cultivated as a major crop after rice, accounting for 32.77% of the total gross cropped area of the state (Anonymous, 2023). It is a dominant fibre crop, cultivated in deep black, red loamy soils and chalk soils mostly under rainfed conditions (Radha et al., 2022). The Nalgonda district recorded the highest area under cotton cultivation (0.26 mha), with an average yield of 554 kg ha⁻¹, but the productivity was highest in the district of Bhadradi Kothagudem district with 806 kg ha⁻¹ (Anonymous, 2022). Agriculture is the primary source of income and employment for the rural households in the district (Sam et al., 2022). However, overall growth of the cotton sector is constrained by the low productivity in the district (Shwetha et al., 2023). In this context, an attempt was made to estimate the costs, returns in cotton cultivation and identify constraints faced by cotton growers in the district.

2. Materials and Methods

2.1. Study area

The study was carried out during 2024–25 during December–April, in the Nalgonda district of Telangana state. This district was selected purposively based on the highest area under cotton cultivation. A simple random sampling without replacement method was employed for the selection of sampled farmers. Two mandals, namely, Gurrampode and Nampalle, were selected, and from each mandal, two villages were selected: Chepur and Palwaivillages from Gurrampode mandal, Peddapur, Pasnoor villages from Nampalle mandal were selected. From each village, 15 farmers were selected randomly, making total sample size of 60 farmers. Primary data was collected using a well-structured schedule through the personal interview method. The cost includes all direct expenses, either in cash or kind, for crop production such as human and machine labour, seeds, fertilizer, herbicide, plant protection, transportation, and irrigation charges. The overhead costs include interest on working and fixed capital, and the depreciating fixed assets. The standard cost concepts were used to estimate the cost of cultivation, such as Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, Cost C2, and Cost C3, as given below.

Total cost=Total variable cost+Total fixed cost

Gross returns=value of the main product + by-product

The Benefit-Cost ratio (B:C)=(Average gross returns (₹ ha⁻¹)/ (Average cost of cultivation (₹ ha⁻¹))

Cost A1 =Includes seed, manures, fertilizer, pesticides, human labour, machine hours, etc.,

Cost A2=Cost A1+rent paid for leased land

Cost B1=Cost A1+interest on fixed capital

Cost B2=Cost B1+rent paid on leased land + rental value of owned land

Cost C1=Cost B1+Imputed value of family labour

Cost C2=Cost B2+imputed value of family labour

Cost C3=Cost C2+10% of C2 cost on the account of the managerial function performed by the farmer.

To work out the returns and farm income measures, the following formula was used.

2.2. Farm income measures

Net returns = Gross returns-Cost C3

Farm business income =Gross income- Cost A2 (FBI)

Family labour income =Gross income-Cost B2 (FLI)

Farm investment income =Farm business income- Imputed value of family labour

2.3. Garrett ranking technique

This technique was used to find out the major constraints faced by sample respondents in cotton cultivation. The respondents were allowed to rank the various constraints in cotton cultivation.

Percent position= $100(R_{ij}-0.5)/N_j$

Where

R_{ij} =Rank given by i^{th} item by the j^{th} respondent.

N_j =Number of items ranked by the j^{th} respondent

The percent position corresponding to each rank was converted into scores using the Garrett ranking table. The constraints were then ranked according to the mean Garrett score assigned to each constraint.

3. Results and Discussion

3.1. Cost of cultivation of cotton

The cost of cultivation of cotton is depicted in Table 1. The total cost of cotton cultivation was ₹ 84693 ha⁻¹, with the operational cost of ₹ 64586 ha⁻¹, and the fixed cost was ₹ 20107 ha⁻¹. Among the various components of cotton cultivation, human labour constitutes the largest share, accounting for 31.90%. Another important cost component was plant protection chemicals (PPC) cost, computed as ₹ 10082 ha⁻¹, and it constituted 11.90%. which may be due to the high pink bollworm infestation. The cost incurred for fertilizer application was estimated at ₹ 9152 ha⁻¹, accounting for 10.81% of the total cost of cultivation. The expenditure for bullock labour was ₹ 4150 ha⁻¹, which was mainly used for intercultural operations. The manure cost was ₹ 2750 ha⁻¹, farmers were applying manure once in two years in cotton



cultivation in the study area. The seed cost was ₹ 3064 ha⁻¹, the expenditure for herbicides was found to be ₹ 1498 ha⁻¹, the irrigation charges and miscellaneous costs were ₹ 320 ha⁻¹, ₹ 450 ha⁻¹, respectively. Among the total fixed costs, the expenditure for the rent value of the own land was calculated as ₹ 15100 ha⁻¹, which was maximum, and constituted 17.83% of the total cost. The share of total variable cost was found to be 76.26%, and fixed cost 23.74% of the total cost of cultivation.

Table 1: Cost of cultivation of cotton in Nalgonda district (₹ ha⁻¹)

Particulars	(₹ ha ⁻¹)
A: Variable costs	
Human labour	27021(31.90)
i. Hired labour	23998 (28.34)
ii. Family labour	3022 (3.57)
Bullock labour	4150 (4.90)
i. Owned bullock	2900 (3.42)
ii. Hired bullock	1250 (1.48)
Machine labour	5018 (5.92)
Seed cost	3064 (3.62)
Manures	2750 (3.25)
Fertilizer	9152 (10.81)
Herbicides	1498 (1.77)
Plant protection chemicals (PPC)	10082 (11.90)
Irrigation charges	320 (0.38)
Miscellaneous	450 (0.53)
Interest on working capital @ 7%	1081 (1.23)
Total variable cost (A)	64586 (76.26)
B: Fixed costs	
Rental value of own land	15100 (17.83)
Rent paid for the leased land	3120 (3.68)
Depreciation @ 10%	652 (0.77)
Interest on fixed capital @ 10%	1235 (1.46)
Total fixed cost(B)	20107 (23.74)
Total cost (A+B)	84693 (100)

Note: Figures in parentheses indicate the % of the total cost

The findings of the cost of cultivation of cotton revealed that the high cost of human labour, was mainly due to the high demand for labour for cotton picking. Similar results were reported by the other researchers in their studies (Radhika and Kumari, 2015b; Singh et al., 2022; Swetha et al., 2023; Radha et al., 2022). Human labour was the major cost in the total cost of cotton cultivation in different parts of India. The cost incurred for PPC was the second major cost. Shwetha et al. (2023) also reported that PPC was one of the major costs

in cotton cultivation in Telangana. The high cost of fertilizers can be attributed to their application more than three times in cotton cultivation, as reported by the farmers. Sam et al. (2023) also stated that fertilizer constitutes 15% of the total cost of cotton cultivation in Telangana.

The cost concepts selected for analysis were cost A1, cost A2, cost B1, cost B2, cost C1, cost C2, and cost C3 are presented in Table 2. The actual expenses incurred for cotton cultivation were considered as Cost A1, which was ₹ 62216 ha⁻¹. Among the cost concepts, Cost C2 is considered the total cost of cultivation, which was estimated as ₹ 81671 ha⁻¹. Cost B1 and Cost B2 were computed as ₹ 63451 ha⁻¹, ₹ 81671 ha⁻¹, respectively. Similarly, the Cost C1 and Cost C2 were calculated as ₹ 66473 ha⁻¹, ₹ 84693 ha⁻¹. There was a slight difference in Cost B1 and Cost B2 to C1 and C2, which was mainly due to low family labour utilization in the cultivation process, which was restricted only to sowing, intercultivation, and fertilizer application. The cost C3, which also included the managerial component of the farmer, was estimated as ₹ 93162 ha⁻¹.

Table 2: Cost concepts in cotton cultivation (₹ ha⁻¹)

Particulars	₹ ha ⁻¹
Cost A1	62216
Cost A2	65336
Cost B1	63451
Cost B2	81671
Cost C1	66473
Cost C2	84693
Cost C3	93162

There was a slight difference between Cost B and Cost C. Khichadiya and Makadia (2020) also reported that there was less variation in Cost B1 and Cost B2 than in Cost C1 and Cost C2 of cotton cultivation in South Gujarat.

3.2. Farm income measure of cotton

It can be inferred from Table 3 that the average yield and price obtained in cotton cultivation were 19.74 q ha⁻¹ and ₹ 7512 q⁻¹. The gross returns were calculated to be ₹ 149346 ha⁻¹, and the B: C ratio was found to be 1.76. These results indicated that cotton cultivation was profitable in the study area. The net returns were estimated as ₹ 64653 ha⁻¹. The farm business and family labour income were found to be ₹ 84010 ha⁻¹, ₹ 67675 ha⁻¹, respectively. The net income was ₹ 64653 ha⁻¹.

3.3. Constraints faced by the cotton growers

Analysis of various constraints faced by cotton growers in the study area revealed that eight different constraints were identified and ranked using Garrett's ranking technique, as indicated in Table 4. The high wage rate of labour for cotton picking was ranked first, with a mean score of 64.48, followed by the non-remunerative price, infestation of the pink bollworm, Non-availability of labour at the time of



Table 3: Farm income measures in cotton cultivation (₹ ha⁻¹)

Particulars	Value
Yield (q ha ⁻¹)	19.74
Price (₹ q ⁻¹)	7512
Gross returns	149346
Net returns	64653
B:C ratio	1.76
Farm business income	84010
Family labour income	67675
Net income	64653
Farm investment income	80988

Table 4: Constraints faced by cotton growers in Nalgonda district (N=60)

Constraints	Mean score	Rank
Non remunerative price	62.07	2
Infestation of the pink bollworm	62.88	3
Non-availability of labour at the time of critical operations	60.27	4
High wage rate of labour for cotton picking	64.48	1
Lack of awareness on the scientific methods of cotton cultivation	53.78	5
Poor quality of seed	38.97	6
Higher amount of expenses incurred on potassium fertilizer	38.53	7
High cost of pesticides	35.12	8

critical operations like weeding and cotton picking were ranked second, third, and fourth in the study area. Another important constraint was the poor quality of seed, the high cost of potassium, and pesticides in cotton cultivation.

The high labour cost for cotton picking was the major constraint. Vaghasiya and Nakum (2025) also found high labour wages for cotton picking in Gujarat state. The second major constraint was non-remunerative price. The results are in line with the findings of Archana et al. (2021) in Haryana, and Gohain and Singh (2018) in Punjab. The next important constraint was an infestation of the pink bollworm, which was a major pest in cotton, increasing the number of pesticide applications, which results in increased cost of cultivation. Shwetha et al. (2023) also stated that the pink bollworm was the major pest in cotton cultivation in Telangana. Lack of awareness of the scientific method was ranked fifth with a mean score of 53.78. These results are reported by other researchers in their studies (Isabella et al., 2015; Das et al., 2022; Padhy et al., 2021). The poor quality of seed, the high cost of potassium, and pesticides were notable constraints

in cotton cultivation in the study area. This was similar to the observations made by other researchers (Darandale et al., 2014; Singh and Pate, 2022).

4. Conclusion

Human labour, plant protection chemicals, and fertilizer were the major costs and B:C ratio was found more than one, indicated that cotton cultivation is profitable in the study area. Infestation of the pink bollworm, and lack of awareness of the scientific method were major constraints. To mitigate these issues, the extension interventions are needed for promoting high-density planting systems for better pest management, pinkboll worm in particular and synchronised boll maturity, which results in reduced labour cost.

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