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Evaluation of economic feasibility of high density planting system over conventional cotton in Nagarkurnool district of Telangana

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Abstract

Cotton (*Gossypium* spp) is one of the major commercial crops cultivated in Telangana, and improving its productivity and profitability is essential for enhancing farmers' income. The present study was carried out in Nagarkurnool district of Telangana to assess the economic impact of the High Density Planting System (HDPS) in comparison with the conventional cotton production system. Primary data were collected from 90 cotton farmers, comprising 45 HDPS adopters and 45 conventional cotton growers, through personal interviews during the agricultural year 2025–26. The present study assessed the economic impact of the High Density Planting System (HDPS) in cotton cultivation compared with the conventional planting system in Nagarkurnool district of Telangana. Primary data were collected from 90 farmers, comprising 45 HDPS adopters and 45 conventional cotton growers. The findings revealed that the average cost of cultivation was higher under HDPS (₹1,41,329.76/ha) than the conventional system (₹1,32,039.97/ha). However, HDPS recorded a higher seed cotton yield (30.46 q/ha) compared to the conventional system (25.82 q/ha). Consequently, HDPS generated higher gross returns (₹2,19,211.37/ha), net returns (₹77,881.61/ha), and a better benefit–cost ratio (1.55) than the conventional system, which recorded gross returns of ₹1,86,161.08/ha, net returns of ₹54,121.11/ha, and a benefit–cost ratio of 1.41.

Keywords: HDPS, conventional, B:C ratio, production, yield, cost of cultivation

Introduction

Cotton (*Gossypium* spp.) is one of the most important commercial fibre crops and plays a significant role in India's agricultural economy, textile industry and rural employment. Despite its importance, cotton productivity in India remains relatively low compared with the potential productivity achieved under improved production technologies. The crop is predominantly cultivated under rainfed conditions, where variability in rainfall, pest and disease incidence, rising labour costs and increasing input prices continue to constrain farm profitability. These challenges have created a need for production technologies that can improve productivity while making more efficient use of land, labour and other farm resources.

The conventional cotton production system generally uses wider plant spacing and relatively low plant population, with farmers relying largely on long-duration hybrids. Although this system has been widely adopted, low plant population and prolonged crop duration can limit productivity and increase the dependence on manual operations, particularly harvesting. Pradeep and Murthy (2019) ^[5] highlighted that the plant population under conventional Indian cotton cultivation is considerably lower than that used in high-density systems in several major cotton-producing countries, indicating scope for improving productivity through suitable plant architecture and closer spacing.

High Density Planting System (HDPS) has emerged as an alternative production technology aimed at increasing the number of plants per unit area through closer spacing and the use of suitable compact and early-maturing cotton genotypes. The system is designed to exploit available land and solar radiation more effectively and potentially increase seed cotton yield per unit area. Kumar *et al.*, 2020 ^[3] identified HDPS as a promising alternative production system,

particularly because it can help address concerns related to crop duration, productivity and the cost of manual harvesting.

The success of HDPS depends considerably on the selection of suitable genotypes, planting geometry and nutrient management. Bharathi (2018) ^[1] reported that closer spacing of 60 × 10 cm under HDPS resulted in higher seed cotton yield, nutrient uptake, gross returns, net returns and benefit-cost ratio than wider spacing treatments. Similarly, Vinay *et al.* (2023) ^[9] demonstrated that genotype and integrated nutrient management practices substantially influenced productivity and profitability under HDPS cotton, emphasizing the importance of matching crop management practices with high-density cultivation. (Bharathi, S. 2018) ^[1].

The economic performance of HDPS is particularly important because higher plant density may alter the requirement for seed, labour, machinery, fertilizers and plant protection inputs. While increased plant population can improve yield, excessive density or inappropriate crop geometry may result in competition among plants for nutrients, moisture and light. Therefore, the economic advantage of HDPS cannot be assessed solely from yield; it must also be evaluated in terms of cost of cultivation, gross returns, net returns, benefit-cost ratio and efficiency of resource utilization. This makes an economic comparison between HDPS and conventional cotton essential for understanding its suitability under farmers' field conditions. (Vinay *et al.*, 2023) ^[9].

Recent field evidence further indicates the potential of HDPS to improve cotton productivity. Thakare *et al.* (2026) ^[8], based on field trials across 120 farms in Akola district of Maharashtra, reported significantly higher yield under HDPS with 90 × 15 cm spacing compared with conventional 120 × 30 cm spacing. The study also observed better canopy development, earlier maturity and improved resource-use efficiency under HDPS.

The relevance of HDPS has also increased because of the growing emphasis on improving cotton productivity through public-sector programmes. The Government of India has promoted HDPS demonstrations under the Special Project on Cotton, particularly for rainfed areas, with the objective of validating suitable agronomic practices and improving and sustaining cotton yields. The programme specifically emphasizes early-maturing, compact plant types suitable for high-density cultivation.

In Telangana, HDPS is of particular interest because cotton is an important commercial crop and a large proportion of cultivation is exposed to rainfall variability and increasing production costs. Research conducted at Professor Jayashankar Telangana State Agricultural University has examined HDPS in relation to genotype selection, nutrient management, productivity and profitability, providing an important technological basis for evaluating its adoption in the state.

However, the benefits of HDPS may vary according to agro-climatic conditions, soil characteristics, genotype, management practices and farmers' ability to maintain the recommended plant geometry. Adoption may also be influenced by factors such as seed cost, availability of suitable varieties, labour availability, mechanization and farmers' technical knowledge. Therefore, location-specific economic assessment is necessary before recommending HDPS as a superior alternative to conventional cotton cultivation. The recent study from Mahabubabad district of Telangana also emphasizes the importance of examining productivity, profitability and adoption gaps under farmers' field conditions. (Malathi *et al.*, 2026) ^[4].

Against this background, a comparative assessment of HDPS and conventional cotton cultivation is important for identifying

differences in resource use, production costs, productivity and profitability. Such an assessment can provide empirical evidence on whether the higher plant population associated with HDPS translates into improved economic returns for farmers. The present study therefore focuses on comparing the cost of cultivation, resource-use efficiency, productivity and profitability of HDPS and conventional cotton cultivation, with the aim of generating location-specific evidence that can support farmers, extension agencies and policymakers in promoting economically viable cotton production systems.

Materials and Methods

Cost of Cultivation

The information related to the cost of cotton cultivation was collected separately from both High Density Planting System (HDPS) Cotton growers and conventional cotton growers through personal interviews using a pre-tested schedule. Information on different cost items such as human labour, machine labour, bullock labour, seed, fertilizers, plant protection chemicals, irrigation, and other cultivation expenses was recorded. The total expenditure on each input was calculated, and its percentage share in the total cost of cultivation was worked out. The cost of cultivation was estimated using the standard cost concepts recommended by the Commission for Agricultural Costs and Prices (CACP), namely Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, Cost C2, and Cost C3. These cost concepts were used to compare the cost of cultivation between HDPS and conventional cotton farming.

Cost concepts

Farm management techniques were used to assess the cost of cultivation of adopter and non-adopter farmers by applying cost concepts including Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, Cost C2, and Cost C3. A detailed description of these concepts is provided below.

Cost A1: It contains all actual cash and kind expenditures spent by the farmer in the course of cultivation

Cost A2: Cost A1 + Rent paid for leased in land

Cost B1: Cost A1 or A2 + Interest on owned fixed capital assets

Cost B2: Cost A1 + Rental value of owned land + Rent paid for leased-in land

Cost C1: Cost B1 + Imputed value of family labour

Cost C2: Cost B2 + Imputed value of family labour

Cost C3: Cost C2 + 10 per cent of cost C2 to account for managerial input of farmer.

Farm Income Measures

1) **Gross Returns:** The value of the main product plus the value of the by-product. The primary products and by-products must be imputed using the current market price or the village level pricing in effect at the time of inquiry.

2) **Net Returns:** Gross income – Total cost of cultivation

3) **Farm Business Income:** This is the return on the farm operator's and his family's labour and investment on owned land and fixed capital.

Farm business income = Gross income – Cost A1

4) **Family Labour Income:** It is the measure of returns of family labour involved in crop cultivation. It was obtained by removing cost B2 (Cost A1 + Rental value of owned land + Rent paid for leased in land) from gross returns.

Family labour income = Gross income – Cost B2

- 5) **Farm Investment Income:** It is the measure of the income that reflects as the returns on capital invested in the farm. It was obtained by deducting imputed family labour from farm business income.

Farm investment income = Farm business income – The imputed value of family labour.

- 6) **Return Per Rupee Spent:** It is the profit made per rupee invested on agriculture production.

Return per rupee spent = Gross return ÷ Total cost (or) Cost C2

Results and Discussion

Comparative Variable Cost Analysis of Conventional and HDPS Cotton

The expenditure incurred on different variable inputs under conventional and HDPS cotton cultivation is presented in Table 1. The results shows that labour constituted the major component of variable expenditure in both production systems. Under conventional cotton cultivation, hired labour accounted for ₹49,715.11 (37.65%), while the corresponding expenditure under HDPS cotton was ₹50,563.75 (35.78%). Family labour expenditure was ₹14,834.95 (11.24%) in conventional cotton and ₹13,657.94 (9.66%) in HDPS cotton. Consequently, the total expenditure on labour was ₹64,550.06 (48.89%) for conventional cotton compared with ₹64,221.69 (45.44%) for HDPS cotton.

The expenditure on bullock labour was relatively similar in both systems, amounting to ₹5,691.98 (4.31%) for conventional cotton and ₹5,785.28 (4.09%) for HDPS cotton. In contrast, expenditure on machinery labour was higher under HDPS cotton

at ₹9,226.82 (6.53%), compared with ₹7,644.99 (5.79%) under conventional cultivation. This higher machinery expenditure may be associated with the greater use of mechanized operations in HDPS cultivation.

The expenditure on seed was ₹1,978.74 (1.50%) in conventional cotton and ₹2,052.84 (1.45%) in HDPS cotton. Fertilizer expenditure was comparatively higher in conventional cultivation at ₹8,088.54 (6.13%), whereas HDPS cotton recorded ₹7,073.26 (5.00%). Similarly, expenditure on plant protection chemicals was ₹7,946.12 (6.02%) under conventional cotton compared with ₹6,884.54 (4.87%) under HDPS cotton. Transport expenditure showed a considerable difference between the two systems, with ₹2,205.42 (1.67%) spent under conventional cultivation and only ₹1,135.56 (0.80%) under HDPS cotton.

The total variable expenditure excluding interest on working capital amounted to ₹94,229.24 (71.36%) for conventional cotton and ₹100,112.52 (70.84%) for HDPS cotton. After including interest on working capital at 7 per cent, the total variable cost increased to ₹95,878.25 (72.61%) for conventional cotton and ₹101,864.49 (72.08%) for HDPS cotton. Thus, the overall variable cost was slightly higher under HDPS cotton, mainly due to greater expenditure on hired labour, machinery labour and certain other inputs. Table 1 indicates that labour was the most important component of variable cost in both cultivation systems. Although HDPS cotton involved a somewhat higher total variable expenditure, it recorded lower expenditure on family labour, fertilizers, plant protection and transport compared with conventional cotton. The difference in the composition of variable costs reflects the distinct input-use pattern followed by farmers under the two cotton production systems.

Table 1: Comparative Variable Cost Analysis of Conventional and HDPS Cotton

Sr. No	Particulars	Conventional Cotton	HDPS Cotton
1.	Hired labour	49,715.11 (37.65)	50,563.75 (35.78)
2.	Family labour	14,834.95 (11.24)	13,657.94 (9.66)
3	Total Labour	64,550.06 (48.89)	64,221.69 (45.44)
4.	Bullock labour	5,691.98 (4.31)	5,785.28 (4.09)
5.	Machinery labour	7,644.99 (5.79)	9,226.82 (6.53)
6.	Seed	1,978.74 (1.50)	2,052.84 (1.45)
7.	Fertilizers	8,088.54 (6.13)	7,073.26 (5.00)
8.	Plant protection	7,946.12 (6.02)	6,884.54 (4.87)
9.	Transport	2,205.42 (1.67)	1,135.56 (0.80)
10.	Total Variable Cost	94,229.24 (71.36)	100,112.52 (70.84)
11.	Interest on working capital @ 7%	1,649.01 (1.25)	1,751.97 (1.24)
12.	Total Variable Cost (I)	95,878.25 (72.61)	101,864.49 (72.08)

Note: Percentages in parentheses are calculated as a percentage of the total cost of cultivation of conventional cotton (132,039.97 = 100%) and total cost of cultivation of HDPS Cotton (₹141,329.76 = 100%)

Overall, Table 1 indicates that labour was the most important component of variable cost in both cultivation systems. Although HDPS cotton involved a somewhat higher total variable expenditure, it recorded lower expenditure on family labour, fertilizers, plant protection and transport compared with conventional cotton. The difference in the composition of variable costs reflects the distinct input-use pattern followed by farmers under the two cotton production systems.

Operation-wise Human and Machine Labour Utilization Profile

The Operation-wise utilization of human and machine labour

under conventional and HDPS cotton cultivation is presented in Table 2. The results show differences in labour use across various field operations between the two production systems. Under conventional cotton cultivation, human labour requirement was 12.50 days for land preparation and sowing, 22.40 days for inter cultivation and weeding, 8.60 days for fertilizer and chemical spraying, 38.20 days for picking and harvesting, and 4.10 days for post-harvest operations and transport. The corresponding human labour requirements under HDPS cotton were 10.20, 18.60, 7.80, 42.50 and 3.20 days, respectively.

Table 2: Operation-wise Human and Machine Labour Utilization Profile

Field Operation	Conventional (Human Days)	HDPS (Human Days)	Conventional (Machine Hrs)	HDPS (Machine Hrs)
Land Preparation & Sowing	12.50	10.20	4.50	6.80
Inter cultivation & Weeding	22.40	18.60	2.10	3.40
Fertilizer & Chemical Spraying	8.60	7.80	1.20	2.10
Picking & Harvesting	38.20	42.50	0.00	1.50
Post-Harvest & Transport	4.10	3.20	1.80	1.50
Total Labour Hours/Days	85.80	82.30	9.60	15.30

A comparison of the two systems shows that HDPS required comparatively less human labour for land preparation and sowing, inter cultivation and weeding, fertilizer and chemical spraying, and post-harvest operations. However, human labour use was higher for picking and harvesting, where HDPS required 42.50 days compared with 38.20 days under conventional cultivation. This higher requirement may be associated with the increased plant population and greater cotton output obtained under HDPS.

Machine use showed a different pattern. For land preparation and sowing, machinery utilization increased from 4.50 hours under conventional cultivation to 6.80 hours under HDPS. Similarly, machine use for inter cultivation and weeding increased from 2.10 to 3.40 hours, while fertilizer and chemical spraying increased from 1.20 to 2.10 hours. Machine utilization during picking and harvesting was 1.50 hours under HDPS, whereas no machine hours were recorded under conventional cultivation. For post-harvest operations and transport, machinery use was slightly lower under HDPS (1.50 hours) than under conventional cotton (1.80 hours).

As shown in Table 2, the total human labour requirement was 85.80 days under conventional cotton compared with 82.30 days under HDPS cotton. Thus, HDPS cultivation used 3.50 fewer human labour days overall. In contrast, total machinery utilization was considerably higher under HDPS at 15.30 hours, compared with 9.60 hours under conventional cultivation. This indicates that HDPS cultivation involved greater use of machinery while reducing the overall requirement for human labour.

The findings suggest that HDPS cotton cultivation was relatively more machinery-intensive and slightly less dependent on human labour than conventional cultivation. However, the higher human labour requirement for picking and harvesting under HDPS remains an important consideration because of the higher plant population and increased harvesting workload.

Comparative Fixed Cost Analysis of Conventional and HDPS Cotton

The expenditure incurred under different fixed cost components for conventional and HDPS cotton cultivation is presented in Table 3. Fixed costs mainly consisted of the rental value of owned land, rental value of leased-in land, depreciation on farm assets and interest on fixed capital. The results indicate some differences in the composition of fixed costs between the two cultivation systems.

Under conventional cotton cultivation, the rental value of own land was estimated at ₹15,746.30 (11.93%), while the corresponding value under HDPS cotton was ₹14,326.00 (10.14%). The rental value of leased-in land was almost similar in both systems, amounting to ₹17,025.40 (12.89%) under conventional cotton and ₹17,032.71 (12.05%) under HDPS cotton. Thus, leased-in land constituted the major component of fixed cost in both production systems. The depreciation cost was relatively small in both groups. It amounted to ₹408.09 (0.31%)

under conventional cotton and increased slightly to ₹505.61 (0.36%) under HDPS cotton. In contrast, the expenditure represented by interest on fixed capital was considerably higher for HDPS cotton. It was estimated at ₹7,600.95 (5.38%), compared with ₹2,981.92 (2.26%) under conventional cultivation. The higher value under HDPS may be related to the greater investment in fixed assets and machinery associated with the production system.

The total fixed cost amounted to ₹36,161.71 (27.39%) for conventional cotton, whereas it was ₹39,465.27 (27.92%) for HDPS cotton. Thus, HDPS cultivation involved a higher fixed cost by approximately ₹3,303.56 per hectare compared with conventional cotton. Although the difference in the share of total fixed cost was relatively small, the composition of fixed expenditure differed between the two systems.

Table 3: Comparative Fixed Cost Analysis of Conventional and HDPS Cotton

Sr. No.	Particulars	Conventional Cotton	HDPS Cotton
1.	Rental value of own land	15,746.30 (11.93)	14,326.00 (10.14)
2.	Rental value of leased-in land	17,025.40 (12.89)	17,032.71 (12.05)
3.	Depreciation @ 10%	408.09 (0.31)	505.61 (0.36)
4.	Interest on fixed capital @ 10%	2,981.92 (2.26)	7,600.95 (5.38)
5.	Total Fixed Cost (II)	36,161.71 (27.39)	39,465.27 (27.92)

Note: Percentages in parentheses are calculated as a percentage of the total cost of cultivation of conventional cotton (132,039.97 = 100%) and total cost of cultivation of HDPS Cotton (₹141,329.76 = 100%)

Table 3 indicates that rental value of leased-in land was the largest component of fixed cost in both cultivation systems. HDPS cotton recorded a somewhat higher total fixed cost, mainly due to the substantially greater interest on fixed capital and slightly higher depreciation expenditure. This reflects the comparatively greater investment requirement associated with the HDPS production system.

Comparative Total Cost Analysis of Conventional and HDPS Cotton

The total cost of cotton cultivation was found to be higher under the High Density Planting System (HDPS) compared to the conventional system. As shown in Table 4, the total cost of cultivation was ₹1,41,329.76 ha⁻¹ for HDPS cotton, whereas it was ₹1,32,039.97 ha⁻¹ for conventional cotton. The higher cost under HDPS was mainly due to greater expenditure on hired labour, machinery labour, working capital and interest on fixed capital. This difference in cost was mainly associated with the more intensive management practices followed in HDPS cotton. Despite the higher cost, HDPS provided better productivity and returns, indicating that the additional investment was economically worthwhile and contributed to higher profitability.

Table 4: Comparative Total cost Analysis of Conventional and HDPS Cotton

Sr.no	Particulars	Conventional Cotton	HDPS Cotton
1.	Total Cost (I + II)	132,039.97 (100.00)	141,329.76 (100.00)

Comparative Cost Concepts in Cotton Cultivation

The various CACP cost concepts for conventional and HDPS cotton are presented in Table 5 which shows that the cost of cultivation was consistently higher under HDPS cotton at all cost levels. Cost A1 was ₹81,451.39 ha⁻¹ for conventional cotton and ₹88,712.16 ha⁻¹ for HDPS cotton, while Cost A2 was ₹98,476.79 ha⁻¹ and ₹1,05,744.87 ha⁻¹, respectively.

Table 5: Comparative Cost Concepts in Cotton Cultivation

Sr. No	Cost Concept	Conventional Cotton (₹)	HDPS Cotton (₹)
1.	Cost A1	81,451.39	88,712.16
2.	Cost A2	98,476.79	105,744.87
3.	Cost B1	84,433.31	96,313.11
4.	Cost B2	117,205.01	127,671.82
5.	Cost C1	99,268.26	109,971.05
6.	Cost C2	132,039.96	141,329.76
7.	Cost C3	145,243.96	155,462.74

Similarly, Cost B1 was ₹84,433.31 ha⁻¹ under conventional cotton and ₹96,313.11 ha⁻¹ under HDPS cotton, whereas Cost B2 was ₹1,17,205.01 ha⁻¹ and ₹1,27,671.82 ha⁻¹, respectively. Cost C1 amounted to ₹99,268.26 ha⁻¹ for conventional cotton and ₹1,09,971.05 ha⁻¹ for HDPS cotton. The comprehensive Cost C2 was ₹1,32,039.96 ha⁻¹ under conventional cotton and ₹1,41,329.76 ha⁻¹ under HDPS cotton, while the Cost C3 was ₹1,45,243.96 ha⁻¹ and ₹1,55,462.74 ha⁻¹, respectively as presented in fig 4.8. Thus, Table 5 indicates that HDPS cotton involved a higher cost of cultivation across all CACP cost concepts, mainly due to the relatively greater use of labour, machinery and other production inputs.

Returns and Profitability Analysis (₹/ha)

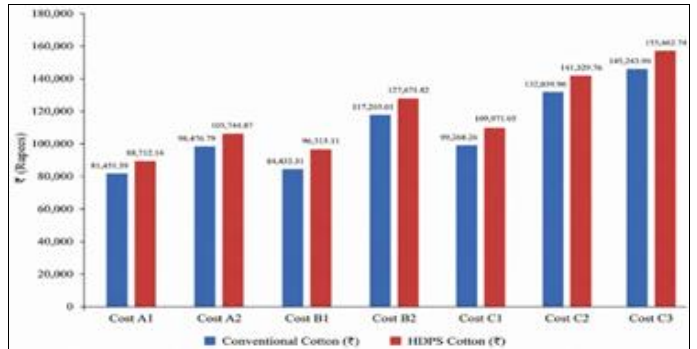


Fig 1: Graphical Representation of Cost Concepts in Cotton Cultivation

As indicated in Table 6, the returns and profitability of HDPS cotton were comparatively better than those of conventional cotton. HDPS cotton recorded a yield of 30.46 quintals ha⁻¹, while conventional cotton recorded 25.82 quintals ha⁻¹. The price received per quintal was slightly lower under HDPS cotton (₹7,197.78) than under conventional cotton (₹7,217.78). However, due to the higher yield, HDPS cotton generated a gross income of ₹2,19,211.37 ha⁻¹ compared to ₹1,86,161.08 ha⁻¹ under conventional cotton. Farm business income was ₹1,30,499.21 ha⁻¹ under HDPS and ₹1,04,709.69 ha⁻¹ under conventional cotton, while family labour income was ₹91,539.55 and

₹68,956.07 ha⁻¹, respectively. The net income obtained from HDPS cotton was ₹77,881.61 ha⁻¹, which was higher than ₹54,121.11 ha⁻¹ under conventional cotton. Further, the benefit-cost ratio was 1.55 for HDPS cotton compared to 1.41 for conventional cotton. Thus, the results showed that HDPS cotton provided higher returns and profitability than conventional cotton, even though its cost of cultivation was relatively higher. These findings are consistent with Sam *et al.* (2023) ^[7], Kumar and Dey, Ramanjaneyulu *et al.* (2024) ^[6]. The present study revealed that the total cost of cultivation (Cost C2) was higher under the High-Density Planting System (HDPS) (₹1,41,329.76 ha⁻¹) than under conventional cotton cultivation (₹1,32,039.97 ha⁻¹). The higher cultivation cost was mainly due to increased expenditure on hired labour, machinery labour and working capital required for intensive crop management.

Table 6: Returns and Profitability Analysis (₹/ha)

Sr. No.	Particulars	Conventional Cotton	HDPS Cotton
1.	Yield (quintals ha ⁻¹)	25.82	30.46
2.	Price (₹ per quintal)	7,217.78	7,197.78
3.	Gross Income	186,161.08	219,211.37
4.	Farm Business Income	104,709.69	130,499.21
5.	Family Labour Income	68,956.07	91,539.55
6.	Net Income	54,121.11	77,881.61
7.	Benefit-Cost Ratio	1.41	1.55

4.2.7 Break-Even and Sensitivity Analysis of Conventional vs. HDPS Cotton Cultivation

The break-even and sensitivity analysis presented in Table 7 showed that HDPS cotton performed better than conventional cotton in terms of yield and economic safety. The actual

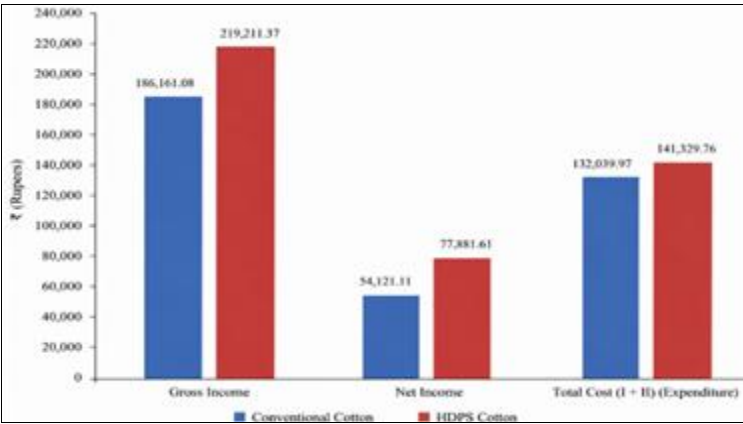


Fig 2: Comparison of Returns and Cost in Conventional and HDPS Cotton

yield obtained under HDPS cotton was 30.46 q/ha, which was 17.97 per cent higher than the 25.82 q/ha recorded under conventional cotton. The output price under HDPS cotton was ₹7,197.78 per quintal, which was marginally lower by 0.28 per cent compared to ₹7,217.78 per quintal under conventional cotton. The break-even yield at Cost A2 was 14.69 q/ha for HDPS cotton compared to 13.64 q/ha for conventional cotton, showing an increase of 7.70 per cent. Similarly, the break-even yield at Cost C2 was 19.64 q/ha under HDPS and 18.29 q/ha under conventional cotton, indicating a 7.38 per cent increase. The break-even price at Cost C2 was lower under HDPS cotton at ₹4,639.85 per quintal compared to ₹5,113.86 per quintal under conventional cotton, representing a reduction of 9.27 per cent.

Further, the margin of safety in yield was higher under HDPS cotton at 35.52 percent compared to 29.16 percent under conventional cotton. Overall, the analysis indicated that HDPS

cotton had a higher yield potential and a greater margin of safety, while its lower break-even price suggested better capacity to withstand adverse price conditions.

Table 7: Break-Even and Sensitivity Analysis of Conventional vs. HDPS Cotton Cultivation

Sr. No.	Economic Indicator	Conventional Cotton	HDPS Cotton	Difference (%)
1.	Actual Yield Realized (q/ha)	25.82	30.46	+17.97%
2.	Actual Output Price (₹/q)	7217.78	7197.78	-0.28%
3.	Break-Even Yield at Cost A2(q/ha)	13.64	14.69	+7.70%
4.	Break-Even Yield at Cost C2(q/ha)	18.29	19.64	+7.38%
5.	Break-Even Price at Cost C2(₹/q)	5113.86	4639.85	-9.27%
6.	Margin of Safety in yield (%)	29.16%	35.52%	+6.36%

Conclusion

The study concludes that HDPS cotton is economically more advantageous than conventional cotton despite its higher cultivation cost. HDPS recorded higher yield (30.46 q/ha), gross returns (₹2,19,211.37/ha), net returns (₹77,881.61/ha) and benefit-cost ratio (1.55) compared with conventional cotton. The higher yield and profitability, along with better economic safety, indicate that HDPS can be a viable alternative to conventional cotton cultivation in the study area.

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