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Study on determinants for adoption of cotton production technology and social impact of cotton grower in Northern Rajasthan

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Abstract
The study was conducted in 2022-2024 crop seasons the investigator is studying in S.K.D. University, Hanumangarh district of Northern Rajasthan. So were done collect the required information by the interview scheduled. The selection of villages was selected randomly from each block, ten villages were selected randomly from each blocks. Thus, the total 20 villages selected for the study purpose. Than the two blocks was selected randomly for the study purpose namely Bhadra and Hanumangarh Blocks of Hanumangarh district Northern Zone of Rajasthan. Selection of the respondents purposively was done by simple random sampling method from every village 10 cotton grower farmers were selected randomly for study so as to constitute a total sample size of 200 respondents. The respondents were contacted personally for data collection. The results of the study depicted that the maximum number of the respondents were found in level of adoption of hybrid Cotton technology (recommended package of practices) by the growers in the categories of preparation of field Ist rank (96.00%) Hybrid Cotton and Seed rate (Kg/ha) Ist rank (72.00%) HYV of cotton. Than the calculate average the total investment on fixed capital (4904278.21) Hybrid Cotton and (47977847.31) HYV of Cotton, average the total investment on fixed capital (4904278.21) Hybrid Cotton and (47977847.31) HYV of Cotton and the per hectare average gross income were higher in case of Hybrid Cotton (Rs. 76930.78) and lower (Rs. 74135.14) in case of HYV Cotton, respectively.

Keywords: Social impact, adoption, income, investment, cost, etc.

Introduction

Cotton (*Gossypium hirsutum* L.) is one of the important crops grown in India, USA, China and Pakistan, contributing 85 percent to the total global cotton production. In India, cotton is grown on 9.2 million hectare area, constituting 27 percent of worlds' cotton area with the highest production in the world. Indeed, the social security and rural livelihood of vast majority of people are greatly dependent upon cotton crop through its production, picking, transportation, trade, processing and marketing etc. (Singh & Sharma, 2015) [11] Therefore, it is important to increase the production and productivity of cotton, especially in traditionally cotton growing areas of arid and semi-arid regions (Singh *et al*., 2018) [10].

In India during 2021-22, production of cotton was 362.19 lakh bales (1st Advance estimates, eands.dacnet.nic.in) cultivated under an area of 119.66 lakh hectares with a productivity of 515 kg per hectare. According to the 2nd advance estimates of 2021-22, cotton production in Andhra Pradesh was 16.25 lakh bales cultivated under an area of 5.23 lakh hectares with a productivity of 528 kg per hectare (des.ap.gov.in) contributing 4.49 percent to total country's production. In India, there are nine major cotton growing states which fall under three zones, viz. the North Zone (Punjab, Haryana and Rajasthan), the Central Zone (Maharashtra, Madhya Pradesh and Gujarat), and the Southern Zone (Andhra Pradesh, Karnataka and Tamil Nadu). Nearly 65 percent of the cotton crop is cultivated under rainfed conditions in the country. Nearly 2/3rd of the Cotton production in India comes from the states of Maharashtra, Gujarat, Andhra Pradesh, and Telangana, collectively known as the Cotton Basket of India. Consumption of cotton by SSI and non-SSI mills It is shown that the consumption of cotton by SSI mills increased by 3.43 percent whereas non-SSI mills, whose growth rate over the years was 3.67 percent. Consumption of Cotton by organized sector textile mills (Non-SSI) has increased consistently from 149.36 lakh bales in 2000-01 to

299.00 lakh bales in 2021-22. Consumption of Cotton by SSI mills has also increased from 10.97 lakh bales in 2000-01 to 23.00 lakh bales in 2021-22. Telangana, Gujarat and Maharashtra are the major producing states in India with a production of 77.52, 73.97 and 62.47 lakh bales respectively in 2020-21. Andhra Pradesh stood at 6^{th} position in terms of area and production of cotton in India during 2020–21. The maximum arrival indices of cotton in the Adoni market were observed in October (177.89%) followed by January (143.41%) and June (116.95%). Minimum arrival indices were observed in August (22.44%) followed by September (65.45%). The highest price indices were observed in March (108.05%), followed by June (105.77%) and February (103.78%). The minimum price indices were observed in April (80.28%) followed by December (94.82%). The average monthly prices of cotton were Rs. 7388, 7912, 7817 and 7807 for the months of September, October, November and December 2021 respectively in Adoni AMC. According to the International Cotton Advisory Committee December report, India's cotton production for the 2021-22 season is projected at 5.90 million metric tons lower from the previous season estimate of 6.00 million metric tons, Cotton yield in this season is expected to be lower by about 20 percent mainly due to unusually heavy rains in the major cotton growing areas of West and South India during September to November 2021. Although the new crop arrivals are slow in the local markets and domestic mills are making limited purchases due to the high prices of the natural fibre compared to the previous season. According to the fibre to fashion textile and apparel (texpro) data, Pakistan cotton production is expected to increase in 2021-22 season by 44.44 percent to 6.50 million bales compared to 4.50 million bales in 2020-21 season due to excellent conditions during harvest and a good growing season. Cotton imports are expected to fall by 6.19 percent during 2021-22 season as compared to 5.33 million bales in 2020-21 season.

Materials and Methods

The study was conducted in year 2022 to 2024 since the investigator is studying in S.K.D. University, Hanumangarh district of Northern Rajasthan. So were done collect the required information by the interview scheduled. The selection of villages was selected randomly from each block, ten villages were selected randomly from each blocks. Thus, the total 20 villages selected for the study purpose. Than the two blocks was selected randomly for the study purpose namely Bhadra and Hanumangarh Blocks of Hanumangarh district Northern Zone of Rajasthan. Selection of the respondents purposively was done by simple random sampling method from every village 10 cotton grower farmers were selected randomly for study so as to constitute a total sample size of 200 respondents. The respondents were contacted personally for data collection. Data were collected with the help of semi-structured interview schedule specially developed on standard scales with some modifications in the light of objectives and analyzed with suitable statistical methods.

Results and Discussion

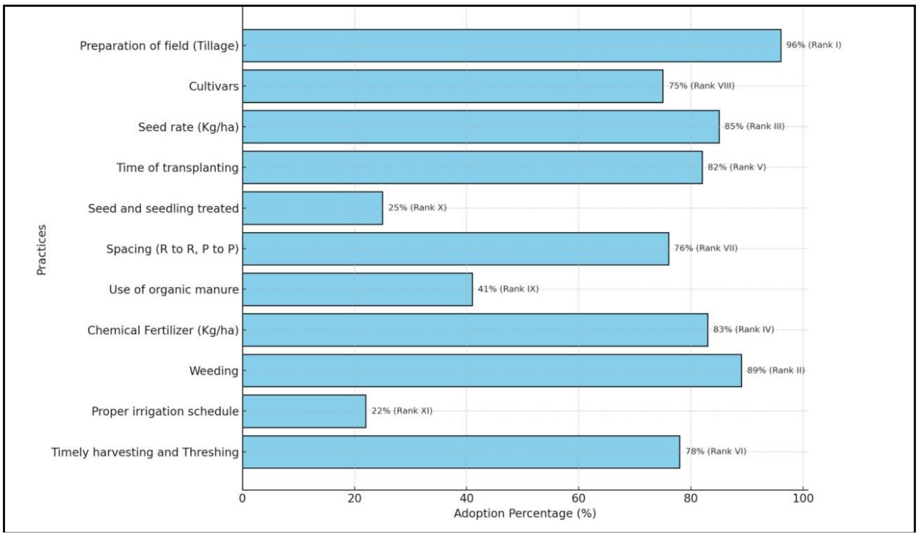
Table 1: Adoption of hybrid Cotton technology (recommended package of practices) by the growers

N=200

S. No.	Recommended package of practices	Level of Adoption	
		Full	Ranks
1.	Preparation of field (Tillage)	96(96.00%)	I
2.	Cultivars	75 (75.00%)	VIII
3.	Seed rate (Kg/ha)	85(85.00%)	III
4.	Time of transplanting	82(82.00%)	V
5.	Seed and seedling treated	25(25.00%)	X
6.	Spacing R to R and P to P/Number of hill/m^2	76 (76.00)	VII
7.	Use of organic manure	41 (41.00%)	IX
8.	Chemical Fertilizer (Kg/ha)	83 (83.00%)	IV
9.	Weeding	89 (89.00%)	II
10.	Proper irrigation schedule	22 (22.00%)	XI
11	Timely harvesting and Threshing	78(78.00%)	VI

Note: More than one items have been shown by respondent, hence the total percentage of all items would be more than 200.

Table-1 the maximum number respondents I^{st} rank (96.00%) were observed in the preparation of field followed by II^{nd} Weeding (89.00%), III^{rd} Seed rate (Kg/ha) (85.00%), IV^{th} Chemical Fertilizer (Kg/ha)(83.00%), V^{th} Seed and seedling treated(82.00%), VI^{th} Timely harvesting and Threshing (78.00%), VII^{th} Spacing R to R and P to P/Number of hill/m^2 (76.00%), $VIII^{th}$ Cultivars (75.00%), IX^{th} Use of organic manure (41.00%), X^{th} Seed and seedling treated (25.00%), and XI^{th} Proper irrigation schedule (22.00%), respectively.



Adoption Levels of Recommended Practices

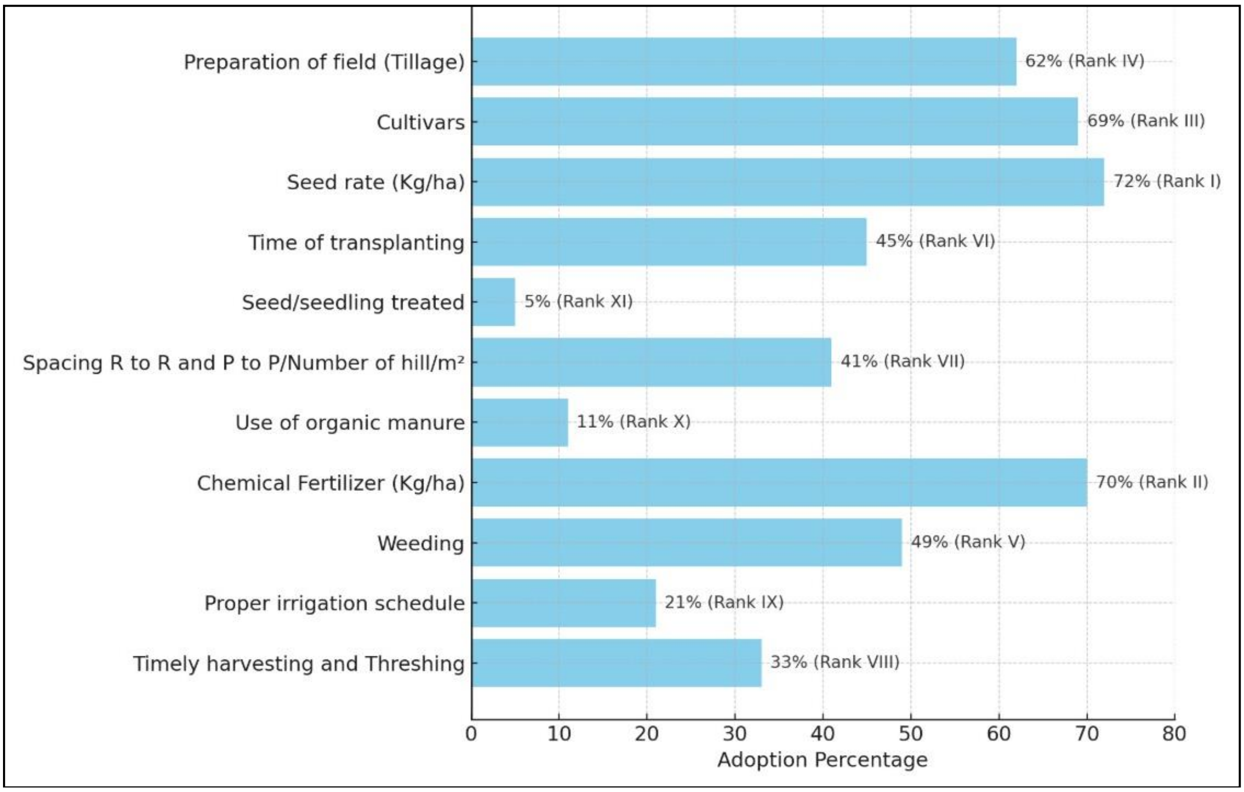
Table 2: Adoption of HYV Cotton technology (recommended package of practices) by the farmers

N=200

S. No.	Recommended package of practices	Level of Adoption	
		Full	Ranks
1.	Preparation of field (Tillage)	62 (62.00%)	IV
2.	Cultivars	69 (69.00%)	III
3.	Seed rate (Kg/ha)	72 (72.00%)	I
4.	Time of transplanting	45 (45.00%)	VI
5.	Seed/seedling treated	05 (05.00%)	XI
6.	Spacing R to R and P to P/Number of hill/m^2	41 (41.00%)	VII
7.	Use of organic manure	11 (11.00%)	X
8.	Chemical Fertilizer (Kg/ha)	70 (70.00%)	II
9.	Weeding	49 (49.00%)	V
10.	Proper irrigation schedule	21 (21.00%)	IX
11.	Timely harvesting and Threshing	33 (33.00%)	VIII

Note: More than one items have been shown by respondent, hence the total percentage of all items would be more than 200.

Table 2 the maximum number respondents Ist rank (72.00%) were observed in the Seed rate (Kg/ha) followed by IInd Chemical Fertilizer (Kg/ha) (70.00%), IIIrd Cultivars (69.00%), IVth Preparation of field (Tillage) (62.00%), Vth Weeding (49.00%), VIth Time of transplanting (45.00%), VIIth Spacing R to R and P to P/Number of hill/m^2 (41.00%), VIIIth Timely harvesting and Threshing (33.00%), IXth Proper irrigation schedule (21.00%), Xth Use of organic manure (11.00%), and XIth Seed/seedling treated (05.00%), respectively. It can be concluded that the maximum numbers of respondents Ist rank (72.00%) were found in the Seed rate (Kg/ha).



Adoption of HYV Cotton technology by the farmers

Table 3: Cost of cultivation of Hybrid Cotton & HYV Cotton (Rs./ha)

(Rupees per hectare)

S. No.	Details (Expenditure/ha)	Hybrid Cotton	HYV Cotton
(A)	Operational costs		
1.	Nursery preparation (ploughing, seed bed preparation and sowing)	1048.2	983.39
2.	Seed Cost	2805.13	1710.05
3.	Main field preparation a) Ploughing and puddling	3087.12	3087.12
4.	Manures and Fertilizers applications	1474.9	1708.07
5.	Cost of Fertilizers (Basel and top dressing)	9550.19	7090.21
6.	Laboures in top dressing	1190.14	800.2
7.	Cost of irrigation	3057.9	3235.16
8.	Seed uprooting+Transplantation	5951.6	6464.7
9.	Weed management	1982.62	1967.34
10.	Cost of Plant protection measure	3461.23	2934.56
11.	Harvesting and Threshing	5956.78	5782.4
12.	Miscellaneous	411.01	371.22
13.	Interest on working capital	1587.07	1445.37
	Total operational costs	41563.90	37579.79
(B)	Rental value of land	11123	10973
(C)	Over head Cost		
1.	Interest on Fixed Capital	5176.09	4881.78
2.	Repairs of dead stock	2588.04	2440.89
3.	Depreciation	3105.66	2929.06
	Total over head cost	10869.79	10251.73
	Total cost	63556.69	58804.53

Note: More than one items have been shown by respondent, hence the total percentage of all items would be more than 200.

Table 3 reveals that the total operational costs cost of Hybrid Cotton (41563.90) and HYV (37579.79), followed by total over head cost (10869.79) Hybrid Cotton and HYV of Cotton (10251.73), respectively.

Table 4: Investment on fixed capital on sample farms

S. No.	Particulars	Hybrid Cotton	HYV Cotton
1.	Land Value (Rs/ha)	4800756.23	4700211.87
2.	Farm Building (Rs/ha)	21564.48	20657.98
3.	Livestock (Rs/ha)	33146.15	32574.7
4.	Irrigation structure (Rs/ha)	26870.35	24981.76
5.	Implement & Machinery (Rs/ha)	14987	13658
6.	Other	6954	5763
	Total	4904278.21	4797847.31
	Total Investment excluding land	103521.98	97635.44

Note: More than one items have been shown by respondent, hence the total percentage of all items would be more than 200.

Table 4 indicates that on an average the total investment on fixed capital (4904278.21) Hybrid Cotton and (47977847.31) HYV of Cotton followed by Total Investment excluding fixed land capital (103521.98) Hybrid Cotton and (97635.44) HYV of cotton, respectively.

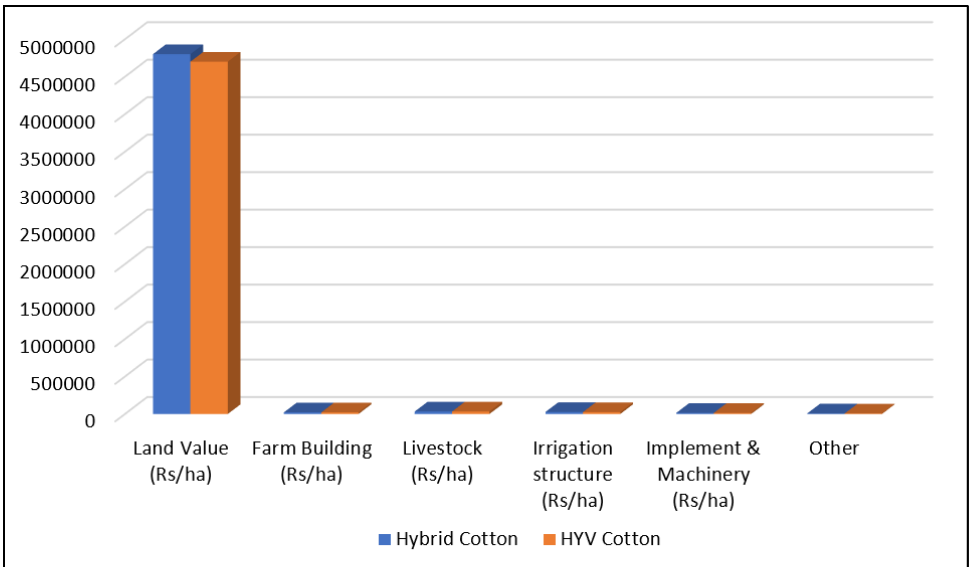


Fig 1: Investment on fixed capital on sample farms

Table 5: Costs & returns of Hybrid Cotton and HYV Cotton

(Rupees per hectare)

S. No.	Particulars	Hybrid Cotton	HYV Cotton
1.	Input cost	63256.68	58625.55
2.	Total yield (q/ha)	52.20	46.50
3.	Yield of by-product (q/ha)	59.37	53.86
4.	Rate of Main product (q/ha)	1283.16	1394.74
5.	Rate of by product (Rs/q)	167.59	169.73
6.	Gross income (main + by-product)	76930.78	74135.14
7.	Net Income	13374.08	15330.62

Note: More than one items have been shown by respondent, hence the total percentage of all items would be more than 200.

Table 5 indicates that the per hectare average gross income were higher in case of Hybrid Cotton (Rs. 76930.78) and lower (Rs. 74135.14) in case of HYV Cotton followed by Input cost (63256.68) and (58625.55), Net Income (13374.08) and (15330.62), Rate of Main product (q/ha) (1283.16) and (1394.74), Rate of by product (Rs/q) (167.59) and (169.73), Yield of by-product (q/ha) (59.37) and (53.86), and Total yield (q/ha) (52.20) and (46.50), respectively.

Conclusion

So, it is conclude knowledge about different variable the maximum number of respondents were found in the level of adoption of hybrid Cotton technology (recommended package of practices) by the growers in the categories of preparation of field Ist rank (96.00%) Hybrid Cotton and Seed rate (Kg/ha) Ist rank (72.00%) HYV of cotton. Than the calculate average the total investment on fixed capital (4904278.21) Hybrid Cotton and (47977847.31) HYV of Cotton, average the total investment on fixed capital (4904278.21) Hybrid Cotton and (47977847.31) HYV of Cotton and the per hectare average gross income were higher in case of Hybrid Cotton (Rs. 76930.78) and lower (Rs. 74135.14) in case of HYV Cotton, respectively.

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