



## Comparative Profitability of Hybrid Cotton Seed Production V/S Commercial Crop Production of Cotton

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### Abstract

The cotton industry is a cornerstone of the global agricultural sector, contributing significantly to economies, employment, and trade. Hybrid cotton seed production, a key aspect of the cotton industry, has undergone a remarkable transformation over the past few decades. This paper covers the aspects related to socio-economic conditions of hybrid cotton seed growers and commercial crop growers of cotton, input utilization pattern and comparative profitability of hybrid cotton seed production and commercial crop production. Data was collected from 120 sample farmers of which 60 are HCSG and 60 from CCG of cotton. Farming experience in case of CCG indicated that half of the farmers (50.00%) had experience of 6 to 10 years, followed by 40 per cent of the farmers who had more than 10 years of experience or history in cotton crop production. Concerning fertiliser usage, CCG is higher with 676 kg as against HCSG (486.18 kg per acre). Crossing materials like plastic lockets (22 kg), cotton threads (18 kg) and pins were commonly used by HCSG in the seed production process. The total cost of production (cost C) incurred by HCSG for per-acre production of cotton seed stood at ₹ 1,78,204, which was almost double that of the total cost of production of commercial crops, which was ₹ 75,746 per acre. Returns per rupee of expenditure results revealed that HCSG obtained ₹ 1.77 returns per rupee of expenditure. Whereas CCG obtained ₹ 1.47 returns per rupee of investment, which was slightly less than the returns obtained by HCSG. This indicated

that hybrid seed production offered a more efficient utilisation of resources in terms of generating returns for every unit of expenditure.

**Key words:** Hybrid, Seeds, Commercial crop growers(CCG), Hybrid cotton seed growers(HCSG),Returns, Input utilization

### I. INTRODUCTION

Cotton is one of the most important fiber and cash crop of India and plays a dominant role in the industrial and agricultural economy of the country. It provides the basic raw material (cotton fibre) to cotton textile industry. Cotton in India provides direct livelihood to 6 million farmers and about 40 -50 million people are employed in cotton trade and its processing. There are four cultivated species of cotton viz. *Gossypium arboreum*, *G. herbaceum*, *G. hirsutum* and *G. barbadense*. Globally, 27 M tonnes of cotton was produced from 33 million hectare of land in the year 2022. Major cotton-producing countries in the world are India, the USA, China, Pakistan and Brazil in area wise. Global exports stood at 9.96 million metric tonnes. The USA is the top exporting country with 2.96 million metric tonnes, followed by Brazil with 2.10 million metric tonnes.

In India, there are ten major cotton growing states which are divided into three zones, viz. north zone, central zone and south zone. North zone consists of Punjab, Haryana, and Rajasthan. Central zone includes Madhya Pradesh, Maharashtra and Gujarat. South zone comprises Andhra Pradesh, Telangana, Karnataka and Tamil



Nadu. Besides these ten States, cotton cultivation has gained momentum in the Eastern State of Orissa. Cotton is also cultivated in small areas of non-traditional States such as Uttar Pradesh, West Bengal & Tripura. Cotton is the basic raw material for textile industry which provides direct and indirect employment to 51 million and 68 million people respectively, signifying the importance of cotton for Indian economy. However, despite being the largest producer of cotton, productivity per hectare in India is quite low with a merely 479 kg per hectares in comparison to 771 kg per hectares at global level (Anon., 2022b).

In Karnataka, average per hectare cotton yield was 274 kgs of lint which is 85 per cent of the national average yield of 322 kgs. In the state, cotton is grown in an area of 8.17 lakh hectares with a total production of 2,330 thousand tonnes desi cotton occupies nearly 30 per cent of the total area under cotton. Cotton is an important commercial crop which can be grown in all parts of Karnataka. Dharwad, Ballari, and Raichur are the major cotton cultivating districts of Karnataka (Anon., 2022b).

#### Cotton seed

The cotton industry is a cornerstone of the global agricultural sector, contributing significantly to economies, employment, and trade. Hybrid cotton seed production, a key aspect of the cotton industry, has undergone a remarkable transformation over the past few decades. Hybrid cotton seeds are engineered to exhibit superior traits, such as increased yield, pest resistance, and better fibre quality. These traits have led to enhanced productivity and profitability for cotton farmers, making hybrid cotton seed production a crucial driver of modern cotton agriculture.

Cotton hybrids are specifically bred to exhibit higher yield potential compared to traditional varieties. They often result in plants with improved growth characteristics, such as increased boll production, more effective utilization of nutrients, and enhanced tolerance to environmental stressors. Hybrid seeds produce plants that are more uniform in terms of growth, maturity and boll development. This uniformity makes it easier for farmers to manage their crops, plan harvesting schedules, and optimize resource allocation. Cotton hybrid seeds are often bred to carry resistance to common pests and diseases that can negatively impact cotton crops. This reduces the need for excessive pesticide use, which is beneficial for both the environment and farmers' profitability. Cotton

hybrids are selected for better fibre characteristics, such as length, strength, fineness, and colour. Improved fibre quality can lead to higher market prices for the cotton produced, benefiting farmers' income.

The global cotton seed market is competitive, with the leading players capturing a whopping share in revenues. Longping High-tech, Monsanto, DowDuPont, Nuziveedu Seeds Ltd, Kaveri Seeds, Mayur Ginning & Pressing Pvt. Ltd, Bayer AG, Corteva Agriscience, Maharashtra Hybrid Seeds Co. (Mahyco), and Namdhari Seeds Pvt. Ltd. are focused on technology advances for new launches at affordable prices. The major players are utilizing strategies including acquisitions & mergers, regional expansion, and partnerships to stand out as strong competitors in the market (Anon., 2023a).

Indian cotton farmers use certified seed, truthful label seed, open market seed and rarely their planting seed. The Seed Act of Govt. of India of 1966, designed to regulate seed quality, seed certification is not mandatory but labelling of seed is compulsory. State Seed Corporations (SSC), Private Seed Companies and other seed-producing agencies market certified seeds through their own seed outlets, distributors and dealers. Agencies other than SSCs also produce truthful label seeds. Private Seed Companies have a major share (more than 55%) in the production and marketing of both public and private bred hybrids. Cotton hybrid seeds hold significant importance in modern agriculture due to their various advantages and contributions to the cotton industry.

Cotton seed production in India is concentrated in five states, namely, Andhra Pradesh, Tamil Nadu and Karnataka in South India and Gujarat and Maharashtra in the central part of India. These five states account for nearly 95 per cent of total cotton seed production in the country. Of the total 98,000 acres of cotton seed production in India in 2021-22, Gujarat has the largest area covering nearly 54,000 acres (55%) followed by Andhra Pradesh with 24,000 acres (24.50%) and Karnataka with 9,000 acres (9.20%) (Anon., 2022c).

The India Cotton Seed Market (seed for sowing) is projected to register a compound annual growth rate of 3.86 per cent hybrids have a higher share in the cotton seed market, accounting for 97.6 per cent of the market value in 2021. The high share of hybrids is due to the high-yielding and pest-resistant properties, which help in reducing the losses and cost of production. In 2021, open-pollinated varieties and hybrid



derivatives accounted for about 2.4 per cent of the Indian cotton seed market. The open-pollinated varieties market is projected to record a compound annual growth rate of 4.4 per cent during the forecast period. The open-pollinated varieties are mainly cultivated in rainfed conditions due to the low cost of seeds and their ability to withstand water stress.

In Karnataka, seed production began in the 1970s and Karnataka was the first state in south India to produce hybrid cotton seeds for commercial cultivation. The Cotton seed production was mainly concentrated in the conventional seed production areas like Raichur, Koppal, Gadag, Bagalkot and Haveri and it was very meagre in the Nonconventional areas like Chikkaballapura and Tumkur. Both public and private organizations and companies are involved in the production and distribution of hybrid cotton seeds. The cotton seed industry has emerged as an important component in the seed market basically due to its ability for the development of hybrids and diversity of production. It becomes very important on the part of the seed producer to deliver good seeds at the right time, at the right place and required quantities for better performance of the company. To satisfy the continuous demand for cotton seeds by the farmers, several seed companies in the corporate sector are supplying seeds in the cotton-growing region (Anon., 2022c).

In Kalyan Karnataka Raichur and Koppala together contribute nearly 50.47 per cent of the area under hybrid cotton seed production in the state. Seeds are mainly distributed through seed coordinators of the respective private companies. In the year 2021-22, the total area under seed production by different companies was 24,895 acres (Anon., 2023b).

Even though there exist many companies that produce hybrid seeds, still demand for cotton hybrid seeds is increasing in India due to shortage of supply. Therefore, there is an urgent need to produce hybrid seeds. Literature of review suggests that lack of studies on the economics of hybrid cotton seeds in the Kalyan Karnataka region which documents the change in cost of cultivation, resource use pattern, factors that are favourable for seed production and what problems farmers are facing in hybrid seed production. With the help of present study these issues can be analysed. The specific objectives of the study are:

1. To study the socio-economic characteristics of Hybrid Cotton Seed Growers (HCSG) and Commercial crop growers (CCG)

2. To study the input use pattern in hybrid cotton seed and commercial crop production of cotton

3. To estimate the comparative profitability of hybrid seed over commercial crop production of cotton

## II. MATERIALS AND METHODS

### Sampling procedure

The present study aimed at examining the economics of hybrid cotton seed production over commercial crop production as well as the problems faced by the farmers in the seed production. Further, this production process also involves the active involvement of the seed companies namely Monsanto, Kaveri, Mahyco, Rasi seeds and Nuziveedu seeds Ltd. Etc and major hybrids grown for seed production are Mahyco 999, JKHy BG-II, AnkurBG-II, RCH779 BG-II, DPC 7095 BG-II etc. Hence, farmers as well as dealers were enlisted as the sampling units to collect the requisite information. The procedure followed for selection of these sampling units is given below.

Multistage random sampling technique was adopted for the selection of samples for the study area. In the first stage, two districts namely Raichur and Koppal were selected. Anecdotal evidence as well as consultation with officials of various institutions like Karnataka State Seed and Organic Certification Agency (KSSC), Office of the Assistant Director of Agriculture (ADA) Raichur, Seed Unit of Agriculture University and secondary data obtained from private hybrid seed producing companies in the study area suggested that these two districts were having large number of hybrid cotton seed growers.

### Selection of talukas

In the second stage one taluk from each district viz., Yelburga in Koppal and Raichur taluk in Raichur district were selected based on maximum area under hybrid seed production according to distribution with various seed coordinators in these districts.

### Selection of villages and hybrid seed growers

In the third stage six villages viz., Merched, Sagamakunta, Appandoddi, Madamdoddi, Yeragunta, Raldoddi village in Raichur and Mudhol, Hiremageri, Challari, Gedageri, Hirewaddarkal and Kadabalakatti in Koppal district were selected based on highest area under hybrid seed production according to data



obtained from seed coordinators. Snow ball technique was adopted for selecting hybrid seed sample respondents within each village and five hybrid seed growers from each village was selected for the study. In total 60 sample respondents involved in hybrid cotton seed production were selected.

#### **Selection of commercial crop growers**

Snow ball technique was adopted for selecting commercial crop growers of cotton were also selected from the same villages as hybrid seed growers. Within each village five commercial crop growers was selected for the study. In total 60 sample respondents involved in commercial crop production were selected. Thus, total of 120 sample respondents were chosen in order to full fill the objectives of the study.

#### **Nature and sources of data:**

The primary data required for the study were collected through personal interview method with the help of pre-tested and well structured schedules and data pertained to the 2022- 23 crop year. The secondary data on area, production, productivity of hybrid cotton seed were collected from Department of Agriculture and Directorate of Economics and Statistics (DSO) of respective districts and district wise seed coordinators.

#### **Analytical tools applied:**

The tabular presentation technique was employed to calculate frequencies, percentages, averages and management cost concepts were applied to know the comparative profitability of hybrid cotton seed and commercial crop production of cotton.

#### **Cost Concepts**

The total input costs of hybrid cotton seed production have been distributed under three heads using the accepted cost concepts 'A', 'B' and 'C'.

##### **Cost A**

Cost A: This cost represents the Actual paid out costs for owner cultivator includes actual expenditure incurred in cash and kind i.e. the cost on account of hired human labour, hired plus owned bullock labour, seed value manure and fertilizers, interest on working capital, depreciation and repair of implement and land revenue, etc.

##### **Cost 'B'**

Cost 'B' comprised of Cost 'A' + imputed rental value of land and interest on fixed capital.

Cost 'C' Comprised of Cost 'B' + imputed value of family human labour. Thus the Cost 'C' presents the total cost of cultivation.

#### **Evaluation of Inputs**

Inputs are the factors of production they refer to those expenses of cultivation that are incurred in the form of cash and kind. The items considered are as : Physical inputs; Human labour, Bullock labour, Machine, Seed, Manures, Fertilizers, Plant protection, Depreciation on implement and machinery. Monetary inputs ;Land revenue, Interest on working capital, Interest on fixed capital, Rental value of the land. And special assessment on labour input usage is done as it holds major share in total cost of production.

### **III. RESULTS**

The present investigation entitled "Comparative profitability of hybrid cotton seed production v/s commercial crop production of cotton" was undertaken with a view to identify the socio-economic characteristics of both HCSG and CCG and to know the difference in input utilization along with profitability of hybrid cotton seed production and commercial crop production of cotton in study area. The data collected were analysed and the results have been presented;

#### **Socio-economic characteristics of HCSG and CCG**

##### **Age composition of the HCSG and CCG of cotton**

The socio-economic characteristics were studied to know the social and economic profile of HCSG and CCG in the study area. The profile of the sample respondents presented in Table.1 revealed that the majority of the HCSG (80.00%) were in the age group of 25–50 years, followed by the above-50-year-old age group (18.30%). It was also noticed that the farmers involved in hybrid seed production had an average age of 43 years, while the average age of commercial crop growers was 40 years in the study area. In the case of CCG, the majority of cotton growers (50.00%) were in the age group of 25–50 years, followed by the above-50 age group (23.30). Similar results were reported by Bhuker et al. (2018) in their study on comparative economics of seed production vis-à-vis commercial grain production.

##### **Education**

It is important to note that the majority of the HCSG had completed primary or high school education (53.30%), followed by college or above



(30.00%) education. In the case of CCG, the majority of farmers were illiterate (46.70%), followed by primary or high school (43.20%). The farmers with moderate education levels showed more inclination towards hybrid seed production than the others.

#### **Caste**

With respect to the social composition, general and OBC castes dominated in hybrid seed production with 36.70 per cent, followed by schedule castes (15%). In the case of CCG, the majority of the cotton growers belonged to the general category (46.60%), followed by OBC (33.30%).

#### **Type of family**

Regarding the type of family, more than half (around 58.30%) of HCSG and 53.30 per cent of CCG had nuclear families, which might be due to various factors such as increasing urbanisation, changes in attitudes and a desire for more privacy.

#### **Size of the family**

The average family size of HCSG was relatively larger, with 6.48 members, when compared with CCG, which has 6.01 members. Slightly more than half (55.00%) of the respondents to HCSG had a family size between 4 and 6 members, followed by large families (45.00%) with more than 6 members. Whereas in CCG, 50.00 per cent of the respondents belonged to medium families, followed by large families (23.30%) with more than 6 members.

#### **Landholding**

With respect to land holding, the average land holding of HCSG was relatively high at 8.65 acres per household when compared with CCG, which was 8.24 acres. Nearly 37 per cent of the farmers in HCSG belonged to the semi-medium category with land holdings of 6 to 9 acres, followed by the medium category (33.33%) with land holdings of 3 to 6 acres. In the case of CCG, 33.33 per cent of farmers had a semi-medium category of land holdings of 6 to 9 acres, followed by 30 per cent of respondents with a medium category of land holdings. It is evident from the study that HCSG dominated CCG in medium and large land holdings. This indicated that HCSG were more likely to divert their land to seed production and other agricultural activities.

#### **Farming experience of HCSG and CCG**

In the study, the experience of the household in hybrid seed and commercial crop production of cotton was also assessed. It was

noted that the average farming experience of HCSG was slightly higher (9.34 years) than the average (8.24 years) farming experience of CCG. More than half (68.30%) of the hybrid seed growers had experience spanning 6 to 10 years, followed by 28.30 per cent having more than 10 years of experience in seed production.

Farming experience in case of CCG indicated that half of the farmers (50.00%) had experience of 6 to 10 years, followed by 40 per cent of the farmers who had more than 10 years of experience or history in cotton crop production. Results indicated that hybrid seed production was highly remunerative and profitable, which encouraged them to continue with this as a primary source of revenue.

#### **Income per annum**

Table 1 also provides us with information on how the HCSG and CCG were distributed based on their economic or income status. Slightly more than half (53.33%) of the farmers had yearly incomes between 1 and 3 lakhs, followed by 3 to 6 lakhs (26.00%) and more than 6 lakhs (13.33%). In the case of CCG, more than half (63.33%) of the farmers had a yearly income between 1 and 3 lakhs, followed by 3 to 6 lakhs (16.66). The high level of income of respondents in the study area indicated that hybrid seed production was more profitable when compared with commercial crop production, as more farmers of HCSG belonged to 3 to 6 lakh and more than 6 lakh income groups.

#### **Input utilization pattern in hybrid seed and commercial crop production of cotton**

Input is the key factor that influences the cultivation of any crop. Efficient utilisation of inputs leads to cost minimization and an increase in yield. Indiscriminate use of inputs causes various problems and effects in the long run. Hence, the input utilisation pattern of hybrid seed and commercial crop producers of cotton would give a clear picture of the extent and efficiency of input usage. Seeds, manures, fertilisers, human labour, machine labour, bullock labour and plant protection chemicals were the inputs used in the production of hybrid seed and commercial crops, as presented in Table.2 and Fig.1

The observed input use pattern was found to be higher in the case of HCSG (2075.73 labour days) than in CCG (963.81 labour days), machine labour (21.13 hours against 2.23 hours), followed by plant protection chemicals (20.96 litres as against 1.83 litres) and bullock labour (18.29 pair



days as against 2.52 pair days). The higher labour requirement in hybrid seed production was due to activities like land preparation, emasculation and pollination, intensive irrigation, inter-cultivation operations and other seed production processes compared to their counterparties.

Table.2, revealed that 1267 grams of seeds were used per acre in hybrid seed production. This is on par with the recommended seeds of 1200 grams per acre. The total quantity of manure applied to enrich soil fertility during the seed production process by HCSG was 1.40 tonnes per acre. Concerning fertiliser usage, CCG is higher with 676 kg as against HCSG (486.18 kg per acre). Crossing materials like plastic lockets (22 kg), cotton threads (18 kg) and pins were commonly used by HCSG in the seed production process. This supports the findings of a study by Bellundagi *et al.* (2016) studied the inter-company economics of Bt cotton seed production in Karnataka.

#### **Cost of production of hybrid seed and commercial crop production of cotton**

The study of costs and returns of hybrid seed and commercial crop production of cotton helps farmers maximise profits by adopting efficient resource management practices. The farm management cost concept is used in estimating the cost of production of hybrid cotton seed and commercial crop production under three groups, viz., cost A, cost B and cost C.

Actual paid-out costs (cost A) for owner-cultivator include expenses on labour utilised for performing cultural operations and expenditure on material inputs like seed, manures, fertilisers, plant protection chemicals, land revenue, depreciation, hired labour, total bullock labour, machine labour and interest on working capital. Imputed cost (cost B), which includes cost A plus the rental value of land and interest on fixed capital. Cost C is the total cost of production, which includes all cost items, actual as well as imputed. The value of holding its own labour is to be imputed and added to Cost B.

The per acre cost incurred for hybrid seed and commercial crop production of cotton is presented in Table.3

The total cost of production (cost C) incurred by HCSG for per-acre production of cotton seed stood at ₹ 1,78,204, which was almost double that of the total cost of production of commercial crops, which was ₹ 75,746 per acre. With respect to actual paid-out cost, hybrid seed production was ₹ 1,64,543, which includes human labour (50.04% of the total cost) as a major

component (Fig 3), followed by plant protection chemicals (18.66% of the total cost) and fertiliser (6.71%) of the total cost of production of hybrid cotton seed. Actual paid-out cost for commercial crop production was ₹ 63,572 per acre. In this case, human labour was the major cost (32.70% of the total cost), followed by fertiliser (17.55% of the total cost) and plant protection chemicals (11.00%) of the total cost of production of cotton.

The imputed cost (cost B) per acre was ₹ 1,68,704 in hybrid cotton seed production, which was as high as commercial crop production ₹ 67,746 per acre. It was found that rental value of land (4.91%) in case of commercial crop production was slightly higher than that of hybrid cotton seed production (2.08%) per acre.

#### **Yield and return from hybrid seed and commercial crop production of cotton**

The hybrid seed production (HCSG) and commercial crop production (CCG) data analysis revealed distinct differences in their respective performance and economic outcomes. HCSG had demonstrated its superiority by achieving substantially higher gross returns compared to CCG. This is evident from the detailed data presented in Table.4.

The results revealed that the production of hybrid seeds outperforms commercial crop production. HCSG obtained 5.5 quintals of cotton seed per acre and the by-product, cotton lint, of 3 quintals per acre, with a remarkable total yield of 8.5 quintals per acre. The impressive average gross return of ₹ 3,17,000 per acre, with ₹ 2,75,000 produced from the sale of cotton seeds and an additional ₹ 42,000 from the sale of cotton lint, further strengthens HCSG's success. This information highlights the commercial viability and profitability of the production of hybrid seeds.

On the other hand, commercial crop production by CCG has yielded a total of 13.04 quintals of cotton kapas per acre. Despite the decent yield, the average gross return from commercial crop production was estimated at ₹1,11,497 per acre, considerably lower than that of HCSG. This stark contrast emphasises the more favourable financial outcomes associated with hybrid seed production.

#### **Cost of production per quintal among different cost categories**

The estimated cost of production per quintal of hybrid cotton seed and commercial crop is presented in Table.5. Results from the analysis



revealed that the cost of production over cost A was ₹ 19,358 in hybrid cotton seed production, whereas it was ₹ 4,875 in commercial crop production. Production cost per quintal over imputed cost (cost B) was ₹ 19,847 in hybrid seed production, which was as high as that of commercial crop production, which was ₹ 5,195. Cost of production per quintal over the total cost (cost C) was also high in the case of hybrid seed production, which was ₹ 20,965 compared to commercial crop production, which was ₹ 5,808 per quintal.

### Returns from hybrid seed and commercial crop production of cotton

Table.6 and Figure 2, shows the analysis of returns obtained by HCSG and CCG for various cost categories. The findings showed that farm business revenue or income (return over cost A) was ₹1,52,457 per acre, which was twice as much as that of commercial crop production, which was ₹47,924. This showed that HCSG got ₹1,04,532 larger returns than the CCG. With respect to farm

investment income or owned farm business income, returns over cost B was ₹ 1,48,296 and net returns (return over cost C) were ₹ 1,38,796 in hybrid cotton seed production. Whereas in case of commercial crop production, CCG obtained farm investment income of ₹ 43,750 and ₹ 35,750 net returns per acre.

Returns per rupee of expenditure results revealed that HCSG obtained ₹ 1.77 returns per rupee of expenditure. Whereas CCG obtained ₹ 1.47 returns per rupee of investment, which was slightly less than the returns obtained by HCSG. This indicated that hybrid seed production offered a more efficient utilisation of resources in terms of generating returns for every unit of expenditure. It was observed from the qualitative information that these hybrid seeds were mainly marketed through the seed coordinator to the respective company, who was appointed by the respective company to act as a guiding and marketing agent in the local area. Along with these activities, the seed coordinator provides technical guidance to farmers with respect to seed production.

**Table.1 Socio-economic profile of the sample respondents in the study area**

Sl. No	Particulars	HCSG(n=60)		CCG(n=60)	
		Number	Per cent	Numbers	Per cent
<b>I</b>	<b>Age group (No.)</b>				
1	<25 years	1	1.70	16	26.60
2	25-50 years	48	80.00	30	50.00
3	Above 50 years	11	18.30	14	23.30
<b>Average age (Years)</b>		<b>43.01</b>		<b>40.3</b>	
<b>II</b>	<b>Educational level</b>				
1	Illiterate	10	16.66	28	46.70
2	Primary or high school	32	53.30	26	43.30
3	College or above	18	30.00	6	10.00
<b>III</b>	<b>Caste</b>				
1	General	22	36.70	28	46.60
2	OBC	22	36.70	20	33.30
3	Schedule Caste (SC)	7	11.66	6	10.00
4	Schedule Tribe (ST)	9	15.00	6	10.00
<b>IV</b>	<b>Type of family</b>				
1	Joint	25	41.60	28	46.60
2	Nuclear	35	58.30	32	53.30
<b>V</b>	<b>Family size</b>				
1	Small (<4 members)	3	5.00	13	21.60
2	Medium (4-6 members)	33	55.00	30	50.00



3	Large (>6 members)	27	45.00	14	23.30
<b>Average family size</b>		<b>6.48</b>		<b>6.01</b>	
<b>VI</b>	<b>Landholding</b>				
1	Small (< 3 acre)	3	5.00	12	20.00
2	Medium ( 3-6 acre)	20	33.33	18	30.00
3	Semi-medium (6-9 acre)	22	36.66	20	33.33
4	Large (>9 acre)	15	25.00	10	16.66
<b>Average landholding (acre)</b>		<b>8.65</b>		<b>8.24</b>	
<b>VII</b>	<b>Farming experience( years)</b>				
1	Low(<6 years)	2	3.30	6	10.00
2	Medium ( 6-10 years)	41	68.30	30	50.00
3	High (> 10 years)	17	28.30	24	40.00
<b>Average farming experience</b>		<b>9.34</b>		<b>8.24</b>	
<b>VIII</b>	<b>Income/annum</b>				
1	< 1.00 lakh	4	6.66	7	11.66
2	1.00-3.00 lakh	32	53.33	38	63.33
3	3.00-6.00 lakh	16	26.00	10	16.66
4	>6.00 lakh	8	13.33	5	8.33
<b>Average income/annum</b>		<b>243333</b>		<b>189234</b>	

**Table 2 Input utilization pattern in hybrid seed and commercial crop production of cotton  
(Per acre)**

Sl. No	Inputs	Units	HCSG	CCG
1	Seeds	Gm	1267.54	1425.06
2	Farmyard manure	Tonnes	1.40	3
3	Fertilizer	Kg	486.18	676.19
4	Micronutrients	Kg	4.68	1.18
5	Human labour	Labour days	2075.73	963.81
6	Bullock labour	Pair days	18.29	2.52
7	Machine labour	Hours	21.13	2.23
8	Plant protection chemicals	Litre	20.96	1.83
9	Crossing materials			-



A	Plastic lockets	Kg	22.00
B	Cotton threads	Kg	18.00
C	Pins	Kg	9.00

**Table 3 Comparative Profitability of hybrid cotton seed production over commercial crop production**

Sl. No	Particulars	HCSG (n=60)		CCG (n=60)		Difference
		Values (₹)	Percentage to total (cost C)	Values (₹)	Percentage to total (cost C)	Values (₹)
1	Human labour	89179.40	50.04	24774.50	32.70	64404.90
2	Bullock labour	3275.58	1.83	3675.87	4.85	-400.29
3	Machine labour	3738.79	2.09	1550	2.04	2188.79
4	Seeds	3804.55	2.13	2579.35	3.40	1225.2
5	FYM	1832.93	1.08	3270.81	4.31	-1437.88
6	Fertilizer	11962.56	6.71	13298.84	17.55	-1336.28
7	Pollination materials	3700	2.07			3700
8	Micronutrients	2363.81	1.32	1289.86	1.70	1073.95
9	PPC	33262.90	18.66	8333.69	11.00	24929.21
10	Land revenue	66.93	0.03	66.98	0.08	-0.05
11	Depreciation	591	0.33	574	0.75	17
12	Interest on working capital@7%	10764.50	6.04	4158.97	5.49	6605.53
<b>Cost A</b>		164543	92.33	63572.80	83.92	10
13	Rental value of land	3715	2.08	3726.16	4.91	100970.20
14	Interest on fixed capital@12%	445.8	0.25	447.14	0.59	-1.34
<b>Cost B(CostA+13+14)</b>		168704	94.66	67746.10	89.43	100957.90
15	Imputed value of family labour	9500	5.33	8000	10.56	1500
<b>Cost C (Cost B+15)</b>		178204	100	75746	100	102458



**Table 4 Yield and return structure of hybrid seed and commercial crop production of cotton  
(₹/ acre)**

Sl. No	Particulars	Yield (q/acre)	HCSG	CCG
1	From seed	5.5	275000	-
2	From lint	3	42000	-
3	From Kapas	13.04	-	111497
4	Total		317000	111497

**Table 5 Cost of production per quintal among different costs  
(Per quintal)**

Sl. No	Particulars	HCSG	CCG
		Cost of production/q	
1	Cost A	19358	4875
2	Cost B	19847	5195
3	Cost C	20965	5808

Note : Yield from hybrid seed production 8.5 q/acre  
Yield from commercial crop production 13.04 q/acre

**Table 6 Returns from hybrid seed and commercial crop production of cotton  
(₹/acre)**

Sl. No	Particulars	HCSG (n=60)	CCG (n=60)	Difference
1	Return over Cost A (Farm business income)	152457	47924.60	104532.40
2	Return over Cost B	148296	43750.90	104545.10
3	Return over Cost C (Net returns)	138796	35750.9	103045.10
4	Returns per rupee of expenditure	1.77	1.47	0.26

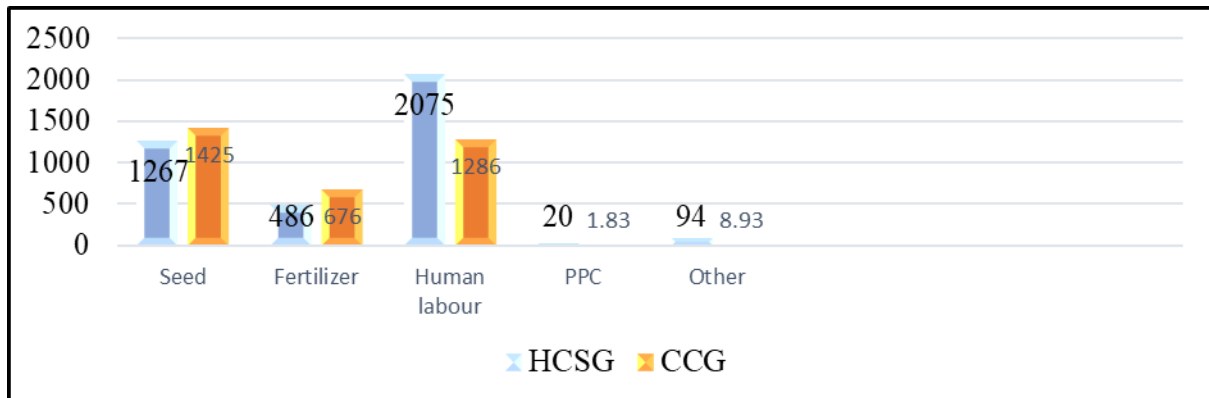


Fig.1 Average quantity of input use by HCSG and CCG

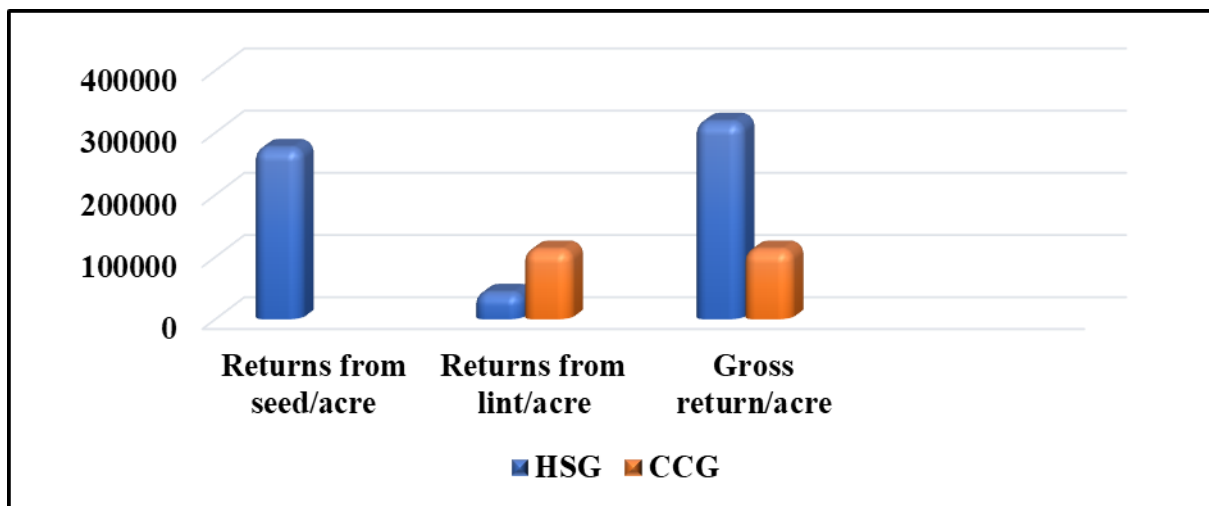


Fig.2 Returns from hybrid seed and commercial crop production of cotton

#### IV. Conclusion and Policy implication

The socioeconomic profile of the respondent suggests that better-off people, people with good education levels, families with large land holdings and families with high incomes go for seed production because they can sustain deferred payments. Small, medium and semi-medium farmers also go for seed production, but in lesser numbers because these categories of farmers need early payment and can't withstand deferred payment as they solely depend on a single source of income. The input utilisation pattern revealed that hybrid seed production was more labour-intensive than the commercial crop production of cotton. There is a scarcity of labour, particularly skilled labour, in the study area. It is necessary to develop suitable equipment and machinery to substitute human labour to carry out the said operations in hybrid seed production, which in turn solves the problem of labour and also increases

farm efficiency. The overall comparisons between hybrid seed and commercial crop production revealed that the production of seeds required a significant amount of cash. The total cost of production difference between producing hybrid seeds and commercial crops was ₹ 1,02,458, showing that producing hybrid seeds was nearly twice as expensive as producing cotton commercial crops. The cost analysis underlines the substantial cost disparities between HCSG and CCG in the Kalyan Karnataka region. Hybrid seed production, due to its specialised nature and inherent requirements, leads to higher production costs across all cost categories.

The comparative analysis establishes that HCSG holds a distinct advantage over CCG in terms of economic performance. The higher yields of both the main product and the by-product, coupled with significantly greater gross returns, highlight the profitability and efficiency of hybrid seed production. This conclusion not only



underscores the economic rationale for favouring HCSG but also suggests the potential benefits of adopting similar hybrid-focused strategies in agricultural practices for maximising returns. The cost of production per quintal in hybrid cotton seed production was almost double that of commercial crop production across all categories of cost. Therefore, efforts such as providing scale of finance and different kinds of production loans for HCSG by institutes like financial institutes, banks and other cooperatives can help farmers reduce the cost of production and encourage farmers to adopt hybrid cotton seed production.

Overall, these findings underscore the potential benefits of hybrid seed production in terms of both net returns, overall type of costs and rate of return per rupee of expenditure, despite the higher initial cost. However, it's essential to consider factors such as market demand, risk management, and long-term sustainability when making decisions related to agricultural production strategies. Further research and analysis may shed light on the broader implications and practical applications of these results within the agricultural sector.

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