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An analysis on the farm productivity and rturns from bt cotton. A case study of coimbatore district

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Abstract: India has made impressive strides on the agricultural front during the past three decades. India is the leading producer in many of the agricultural crops including the commercial crops. Objectives of the study, To analyse the socio economics conditions of the Cotton farmers in the study area and study the cost of cultivation of Bt cotton farmers in the study area. Methodology of this study, in order to estimate the impact of BT cotton on existing cropping pattern in the district of Coimbatore, a survey was conducted in the rural areas of the district. A sample of 500 respondents was taken from the cotton growing villages of the district namely, Anaimalai, Annur, Karamadai, Kinathukadavu, Madukarai, Pollachi, Sarkarsamakulam and Sulur are the major blocks were BT cotton are grown. Important findings of the study, on the use of inputs in the cotton farm activity indicated that, for a majority of the inputs, the use of these inputs increases with the increase in the size of holdings and the reason put forth was that a majority of the sample growers particularly, the small, medium and large growers adopt mechanization in cotton farming which is the cause of higher usage of agricultural inputs. Suggested in this study, The low productivity added with the poor quality of the product results in poor for the product which ultimately results in poor returns. The higher share of expenditure incurred on pests and disease control and for the application of higher dose of chemical pesticides and labour intensive nature of cultivation are the probable reasons for high cost of production.

Key words: Cost, Return,Productivity, Farm etc.,

INTRODUCTION

India has made impressive strides on the agricultural front during the past three decades. India is the leading producer in many of the agricultural crops including the commercial crops. To sustain the agricultural productivity, the country has embarked upon the introduction of hybrid seeds and a recent introduction of one such hybrid variety is the BT cotton. The BT cotton, inspite its controversies, has been gaining popularity due to its economic profits. In the present paper it is attempted to examine the cost and revenue aspect of BT cotton in the context of the district of Coimbatore which is a major producer of cotton in the state of Tamil nadu.

STATEMENT OF PROBLEM

The agriculture sector is the backbone of the country‘s economy and all time shelter for bulk of the population which provides employment throughout the year and partially restricts the flow of population from rural to urban areas. In 2011-12, agriculture accounted

for 19.5 percent of India's Gross National Product[9] (GNP) while 70.0 percent of India's workforce was engaged in farming. With increasing demand for agricultural produce due to increasing population on the one hand and the fast declining area under cultivation, there is a need for increased productivity of almost of all agricultural crops and among them cotton an important commercial crop in India. In this research paper based on the socio economic conditions of cotton farmers and cost, expenses and returns of cotton cultivation in this area. Title of this study, An Analysis On The Farm Productivity And Rturns From Bt Cotton. A Case Study of Coimbatore District

Objectives of the study

1. To analyse the socio economics conditions of the Cotton farmers in the study area and
2. To study the cost of cultivation of Bt cotton farmers in the study area

METHODOLOGY

In order to estimate the impact of BT cotton on existing cropping pattern in the district of Coimbatore, a survey was conducted in the rural areas of the district. A sample of 500 respondents was taken from the cotton growing villages of the district namely, Anaimalai, Annur, Karamadai, Kinathukadavu, Madukarai, Pollachi, Sarkarsamakulam and Sulur are the major blocks were BT cotton are grown. From these eight blocks, four blocks were selected at random and from these four blocks five villages were identified using the random sample method. This gave a total sample village of 20. From each of these identified 25 villages, 20 farmers growing BT cotton were identified from the list obtained from the Agricultural Cooperative Societies operating in the nearby village. These farmers were met and required data were collected with the help of a structured pre tested questionnaire. The collected data were analyzed using the simple percentage method and a multiple regression model.

ANALYSIS AND INTERPRETATION OF DATA: RESPONDENTS BY SOCIO ECONOMIC STATUS

TABLE: 1
DISTRIBUTION OF SAMPLE RESPONDENTS BY SOCIO ECONOMIC STATUS

Age (in Years)	**No. Of Samples**	**Percentage**
Less than 35	34	6.80
35-45	43	8.60
45-55	194	38.80
55-65	151	30.20
65 and above	78	15.60
Total	500	100.00
Education Level	**No. Of Samples**	**Percentage**
Illiterate	48	9.60
Primary	42	8.40

Middle	141	28.20
Secondary	237	47.40
HSC	31	6.20
Degree	1	0.20
Total	**500**	**100.00**
Family	**No. Of Samples**	**Percentage**
Nuclear	304	60.80
Joint	196	39.20
Total	**500**	**100.00**
Size of Family	**No. Of Samples**	**Percentage**
2	16	3.20
3	39	7.80
4	137	27.40
Above 4	308	61.60
Total	**500**	**100.00**
Dependents	**No. of Samples**	**Percentage**
1	8	1.60
2	241	48.20
3	101	20.20
Above 3	150	30.00
Total	**500**	**100.00**

Source: Computed from Primary Data.

Age is an important socio economic variable determining the expertiseness in cotton cultivation and production. Hence, more the age more is the experience in cotton cultivation and hence is more is supposed to be the production of cotton. As it is seen in table 1, the highest share of 38.80 per cent of the cotton growers are in the age group of 45-55 years while the least share of 6.80 per cent are in the age group less than 35 years.

Education helps to create awareness on the latest technique of agriculture which results in the higher level of cotton production. As seen in the table, among the sample respondents, 47.40 per cent are just primary level of education completed which constituted the highest while the least share (0.20 per cent) is degree holders.

The type of family is an important demographic factor that determines the time spent in farming. The farmer from a nuclear family may be able to spare much time in farming, while in the case of joint family it is expected to be less. As it is seen in the table, among the sample respondents 60.80 per cent belong to nuclear family system, while the remaining 39.20 per cent belong to the joint family system.

As given in the table, 61.60 per cent of the families have more than four members and this constituted the highest. While the least share of 3.20 per cent of the families there are two members.

The data on the number of dependents in the sample farmers‘ families provided in the table indicates that in 48.20 per cent of the respondents‘ families, the number of dependents is two which constitutes the highest, while in 1.60 per cent of the families the number of dependents is one which forms the least.

FARM PROFILE AND FARM PRACTICES:
SAMPLE RESPONDENTS BY NATURE OF OWNERSHIP OF LAND

TABLE: 2
DISTRIBUTION OF SAMPLE RESPONDENTS BY PROFILE OF FARM

Ownership	**No. of Respondents**	**Percentage**
Individual	488	97.60
Jointly	12	2.40
Total	500	100.00
Size of Land Holdings	**No. of Respondents**	**Percentage**
Less than 0.5	12	2.40
0.50-1.00	22	4.40
1.1-1.50	37	7.40
1.50-2.00	59	11.80
2.01-4.00	82	16.40
4.01-10	233	46.60
Above 10	55	11.00
Total	500	100.00
Experience in Farming (in years)	**No. Of Samples**	**Percentage**
Less than 5	12	2.40
5-10	51	10.20
10-15	78	15.60
15-20	193	38.60
20-25	148	29.60
Above 25	18	3.60
Total	500	100.00

Note: Marginal 0.01 to 1.00 ha.; Small 1.01 to 2.00 ha; Semi-Medium 2.00 to 4.00 ha; Medium 4.01 to 10.00 ha; Large above 10 ha.
Source: Computed from Primary Data.

The nature of ownership of land is an important factor determining the level of production, productivity and eventually the farm practices.

As it could be seen in table 2, among the sample respondents of 500, 97.60 per cent are single or individual owners of their cultivating land, the remaining 2.40 per cent cultivate their lands jointly.

In the case of land holdings of the sample cotton farmers, there are 41 per cent respondents who hold less 0.50 hectares of land. Another 33.60 per cent of the farmers hold 0.50 to one hectare of land. The total of the two indicates that almost 75 per cent of the sample farmers are marginal farmers. In the case of small holdings, there are 18.60 per cent farmer respondents. While 4.20 per cent of the respondents are semi-medium farm holders, 1.60 per cent are medium farm holders. Just one per cent of the sample respondents are larger farmers.

As it could be seen in table 4.26, among the sample respondents, 38.60 per cent have a farm experience of 15-20 years which farms the highest, while 3.60 per cent of the sample cotton growers who have above 25 years forms the least share.

OPERATION-WISE COST, REVENUE AND GROSS PROFIT AMONG SAMPLE COTTON FAMRS:

TABLE: 3
COST OF CULTIVATION OF BT COTTON

Size of Land	OP1	**OP2**	**OP3**	**OP4**	**OP5**	**OP6**	**OP7**	**OP8**	**OP9**	**OP10**	**OP11**	**OP12**	**Total**
Expenses (in Rs./ha)	3952 (8.86)	2673 (5.99)	5251 (11.77)	1926 (4.32)	3822 (8.57)	5752 (12.89)	3160 (7.08)	3522 (7.89)	2967 (6.65)	7238 (16.22)	2785 (6.24)	1565 (3.51)	44613 (100.00)

OP1 = Ploughing **& Preparation of Land, OP2 = Harrowing, OP3 = Seed, OP4 = Sowing, OP5 = Fertilizer, OP6 = FYM,**
OP7 = Pesticides, OP8 = Weeding & Interculture, OP9 = Irrigation, OP10 = = Harvesting (Picking), OP11 = Transport & Marketing and OP12 = Others.
Source: Computed from Primary Data.

A close perusal of the data provided in table 3 would indicate that the total of expenses for all farm operation stood at Rs. 44613 per ha. The operation wise analysis would indicate that Rs. 3952 in the case of Ploughing & Preparation of Land, Rs. 2673 in the case of Harrowing, Rs.5254 in the case of Seeds, Rs. 1926 in the case of the expenditure on Sowing, Rs. 3822 in the case of the purchase of Fertilizer, Rs. 5752 in the case of the purchase of Farm Yard Manure, Rs. 3160 in the case of Pesticides purchase, Rs.3522 in the case of the cost of the cost incurred in Weeding & Interculture of the cotton farm, Rs.,2967 in the case of irrigating the land, R.s.7238 in Harvesting (Picking), Rs.2785 in the Transport & Marketing of the cotton produce and Rs. 1565 as miscellaneous expenses. The above discussion on the use of inputs in the cotton farm activity indicated that, for a majority of the inputs, the use of these inputs increases with the increase in the size of holdings and the reason put forth was that a majority of the sample growers particularly, the small, medium and large growers adopt mechanization in cotton farming which is the cause of higher usage of agricultural inputs.

FACTORS CONTRIBUTION TO PRODUCTIVITY OF COTTON: A PRODUCTION FUNCTION ANALYSIS

TABLE: 4
FACTORS CONTRIBUTION TO PRODUCTIVITY OF COTTON: REGRESSION RESULTS
Dependent variable: Cotton yield (q/ha)

Variables	Estimated co-efficient	Standard Error	t-values
Constant	0.6875	0.46525	1.407
Human labour	0.3872*	0.0918	3.846
Machine labour	0.0997*	0.0364	4.954
Fertilizer—Potash	0.0385*	0.0809	2.007
Plant protection chemicals	-0.0471*	0.00659	6.116
Irrigation	0.0512	0.0276	1.569
R2	0.9312		
Adjusted R2	0.9282		
F-value	1277.25		
DF	6		
D	494		

Notes: * indicates significant at 5 per cent level.
Source: Computed from Primary Data.

The earlier paragraph provided a detailed discussion on the farm practices of the sample cotton growers in the district of Coimbatore. Given these discussions, in the present paragraph it is attempted to examine the impact of farm related factors on the productivity of

cotton. To capture the yield response of cotton and the yield effect due to Bt seed more precisely, a production function analysis was carried out. Following the convention and the straightforward way in which the elasticities of production could be obtained, the Cobb-Douglas production has been used in the present study and the results are presented in Table 4. The adjust R^2 value of 0.0.9312 Indicates that as high as 93 per cent of the variation in the dependent variable, that is productivity, is being explained by the five independent labour and capital related variables considered for the analysis. Among the coefficients estimated, the coefficient arrived at in the case of the variable on human labour is 0.38752. This indicates that every one unit(human days per hectare) of increase in human labour increases the productivity of cotton by 0.38 quintal per hectare. The coefficient arrived at in the case of machine labour with 0.0997 implies that every one unit (hour per hectare) of increase in the machine labour increases the productivity by 0.0097. It can be inferred that the productivity contribution by (human) labour is found to be higher than the machine labour and the probable explanation for this higher contribution of human labour than the machine labour is that with the application of capital namely, the tractors and other machineries, the users of these machineries namely the human labour productivity increases.

The coefficient of fertilizer, namely potash is 0.0385. This implies that every one unit (kgm.) of increase in the application of fertilizer increases the cotton productivity by 0.0385 quintals per hectare. The estimated coefficient for the variable on plant protection chemicals is -0.0471. This indicates that that every one unit (litres per hectare) of increase in the application of pesticides reduces the cotton productivity by 0.0471 quintals. The probable explanation for a negative coefficient is that farmers use excessive quantities of pesticides than the recommended level which contributes negatively to productivity. In the case of the coefficient of irrigation, the coefficient arrived at as 0.0512 indicates that every unit (number of irrigations) of increase in irrigation increases the productivity of cotton by 0.0512 quintals. However, the variable is not significant. The probable explanation for this variable to turn out to be insignificant is that all the farmers irrigated to the recommended level and there was not much variation in number of irrigation across farms.

Thus from the above analysis, it can be concluded that except irrigation, all the variables included in the analysis were found to be statistically significant in explaining the yield variability of cotton.

SUGGESTIONS OF THIS STUDY

The study attempted to examine the socio economic and demographic profile of the BT cotton farmers. The revealed that the due to high cost of production only a medium and large farmers show interest in raising BT cotton in the study area. Also, the productivity of BT cotton in the study area is also found to be far lower when compared to the state average. The low productivity added with the poor quality of the product results in poor for the product which ultimately results in poor returns. The higher share of expenditure incurred on pests and disease control and for the application of higher dose of chemical pesticides and labour intensive nature of cultivation are the probable reasons for high cost of production. Having established the fact that BT cotton has high yield and higher profits inspite of the higher cost of production, the low productivity and poor price for the product is really surprising in the context of the study area. Hence, awareness on the intensive use of new technologies of production has to be popularized. Also, it is found that the farmers are not properly trained in adopting bio-safety measures such as growing refugee crops so as to avoid building-up of the resistance by bollworms against the Bt toxin. Therefore, the non-economic benefits and bio-safety measures should also be given adequate attention in the creation of awareness. As indicated above, the high cost of seeds and incidence of pests and diseases

other than bollworm are found to be the bottlenecks in Bt cotton cultivation which affects the production and profits. Therefore, continuous efforts are necessary to evolve pest- and disease-resistant varieties and to reduce the cost of cultivation. The negative coefficients arrived at in the case of the variable on pest indicates that the more than optimum level of use of pest by the farmers in the cotton filed which may also be a cause of poor productivity. Hence, the farmers are to be educated on the optimum level of use of pest. It can also be seen in the table on the production function analysis that the application of fertilizer has positive impact on cotton yield and hence application of optimum quantity of potash should be recommended to the farmers.

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