

## RESEARCH PAPER

# Analysis of extent of adoption of Bt cotton recommended production practices followed by the farmers

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## ABSTRACT

The study on knowledge and adoption of Bt cotton recommended production practices followed by farmers was carried out during 2010-2011 in three taluks of Raichur district, having highest area under the crop. Study was conducted by collecting data from 120 respondents of 12 villages using pre-tested standardized interview schedule. The important findings of the study were, less than half of the respondents (45.00%) belonged to medium level of adoption category whereas, most of the respondents adopted the mallika hybrid (62.50%) followed by bunny (45.83%). Cent per cent of respondents adopted manual dibbling method of sowing and 80.00 per cent had sown the crop within the time. Majority 74.17 per cent of the respondents had adopted the seed rate as per the recommendation and only 7.50 per cent of the respondents applied the quantity of FYM as per the recommendation. Around 47 per cent of the respondents adopted recommended doses of nitrogen followed by only 34.17 per cent and 33.33 per cent of phosphorus and potash, respectively but none of the respondents adopted the intercropping, green manure and bio-fertilizer practices. Thus, quantity of FYM and application of fertilizer, control measures for pests and diseases were adopted by less number of respondents. Since these practices are crucial for obtaining higher yield, hence, line departments should consider these aspects and mobilize their system to educate farmers. Co-relation analysis reveals that education extension contact and risk orientation showed positive and significant relationship at 0.01 level of probability, where as farming experience, annual income, mass media participation and extension participation, achievement motivation, scientific orientation and land holding exhibited positive and significant relationship at 0.05 level of probability with their adoption of Bt cotton farmers.

**Key Words :** Adoption, Knowledge, Correlation, Bt cotton and SES

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Cotton, the 'White Gold' and 'King of Fibres' is a crop of prosperity and is considered to be an industrial commodity of worldwide importance. Cotton occupies a predominant place among cash crops touching the country's economy at several points by generating direct and indirect employment in the agricultural and industrial sectors. Cotton industries provide means of livelihood for about 250 million people through its cultivation, trade and industries in India. In cotton bollworms cause significant yield losses. Sources of resistance to the bollworms in the germplasm of cotton the world over are not available. Moreover, about 10 per cent of insecticides on global basis and 45 per cent in India are used for control of insects in cotton crop alone. Insecticides have adverse effects on natural predators and parasites of

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bollworms, beneficial insects, human health and microorganisms such as earthworm, blue green algae and nitrogen fixing bacteria. Researches on the biotechnological approaches have offered an alternative to this in the form of Bt cotton.

In Karnataka, Bt cotton occupies an area of 4.16 lakh ha with a production of 4.85 m tonnes (Anonymous, 2010). Raichur is one of the potential Bt cotton growing district with an area of 29388 hectares (Anonymous, 2010). Past numbers of studies have examined the significant technological, economic and environmental benefits derived from growing Bt cotton across the globe including India. However, the studies conducted on farmers' knowledge and adoption levels of Bt cotton are less. Though a number of improved production technologies are recommended by the researchers and extension workers to obtain maximum profit, measuring the farmers knowledge and adoption level of Bt cotton are important factors which helps them to realize the higher yield and greater returns from Bt cotton cultivation.

## RESEARCH METHODOLOGY

The study was conducted in 2010-2011 in Raichur, Manvi and Deodurg taluks of Raichur district, Karnataka state. Based on highest area under Bt cotton cultivation. The study aims to know the knowledge level of Bt cotton farmers about recommended production practices. Four villages were selected from each taluk. From each village 10 farmers under irrigation condition were selected by random sampling procedure to constitute a sample size of 120 for the study. Data were collected by the personal interview method using structured interview schedule. The suitable tools like frequency, percentage, correlation were used to draw valuable inferences from the research study.

## RESEARCH AND REMONSTRATION FINDINGS

The results obtained from the present investigation are presented below:

### Overall adoption level of respondents:

The results presented in Table 1 reveal that 45 per cent of the respondents belonged to medium adoption category, while 29.17 and 25.83 per cent of respondents belonged to low and high adoption categories, respectively. The previous finding indicated that the 50.83 per cent of the respondents had medium level of knowledge of Bt cotton cultivation practices. This would certainly influence the adoption levels of the respondents. Percentage of respondents having medium level of knowledge (50.83%) and adoption (45.00%) are almost corresponding to each other.

Knowledge level influence the level of action as it is pre

requisite for decision making. Besides the knowledge, the resources available with the farmers also have bearing on the adoption level. Each farmer tends to modify certain practices to fit into his resource matrix. Therefore, knowledge level coupled with resource availability could be the reasons for medium level of adoption of Bt cotton practices. Majority of the respondents in the present study were educated, with high income and large land holdings. These must have contributed for higher adoption of Bt cotton as 25.83 per cent of them had high adoption level and 45.00 per cent had medium adoption level, together contributing for more than 70 per cent. The findings of the study are in accordance with the findings of Bhagawat and Gohad (2003) and Raghavendra (2005).

### Adoption level of individual Bt cotton cultivation practices by the farmers:

Data presented in the Table 2 indicated that all the respondents fully adopted the improved hybrids of Bt cotton best suited to their region. Seed is the crucial input influencing the yield level. Farmers, knowing this fact very well, certainly put sincere efforts to obtain requisite hybrid to ensure better crop yield and about 80 per cent of the farmers fully adopted the practice of right sowing time and 20.00 per cent had partially adopted it. This operation is dependent not only on labour availability but also on moisture in the field. Study area was dominated by canal irrigation facility where labour and water availability should coincide to implement the operation at right time. This could be the reason why cent per cent of them could not take up the operation, besides there may also be other personal factors for delay in sowing time. All the respondents fully resorted to manual dibbling of seeds. Dibbling in such areas produces very good results by securing uniform stand of properly spaced plants. Majority (74.17%) and 25.83 per cent of the respondents had fully and partially adopted the recommended seed rate. As mentioned earlier the Bt cotton seeds are sold in combi pack and majority farmers do not sow non Bt cotton seeds all along the boundary to use as trap crop as they feel that it reduces their yield level. Seeds of Bt cotton are expensive and farmers tend to save the money by purchasing less quantity of seeds than the recommended dose.

The spacing was fully adopted by respondents 35.00 per cent and partially by 65.00 per cents. Under conditions of good plant growth such as greater fertility of the soil, availability of moisture, early sowing farmers tend to keep closer spacing than the recommended. This could be the reason for farmers adopting varying spacing. More than 50 per cent farmers partially adopted all the chemical fertilizers and less than one fourth of them fully adopted the practices. This is one practice next to seeds which demands cash in hand to purchase and also there could be inadequate

**Table 1 :Overall adoption level of improved Bt cotton cultivation practices by farmers (n=120)**

Category	Frequency	Percentage
Low (mean - 0.425*SD)	35	29.17
Medium (mean $\pm$ 0.425*SD)	54	45.00
High (mean +0.425*SD)	31	25.83

Mean =28.32 SD =7.01

knowledge among the respondents about the benefits of applying fertilizers as per the recommendation. None of the respondents adopted intercropping as it reduces the crop stand and hence the yield. Further, they were in the notion of hindrance in the intercultivation and hand weeding operations. As Bt cotton is resistant to major pest, farmers would have thought to go for monocropping to obtain higher yield.

Majority of the farmers (68.33%) fully adopted the hand

weeding practice whereas 9.17 per cent of respondents fully adopted recommended herbicide practices. Disease control methods were adopted by less than half of respondents adopted for angular leaf spot and cotton rust. The high cost of chemicals, the relative advantage of the practice, and the threshold level of the diseases etc would influence the adoption of these practices. The adoption of the pest control measures was to the extent of 82.50 per cent (28.33% full and 54.17% partial) for sucking pests. Many reports reflected that there was unusual incidence of sucking pests in Andhra Pradesh and Karnataka. It could cause damage to the crop to the extent of more than 30 per cent. Monoculture of cotton could have contributed for occurrence of sucking pests that could have impelled as large as 82.50 per cent farmers to adopt recommended practice.

**Table 2: Extent of adoption of improved individual cultivation practices of Bt cotton crop by the respondents (n=120)**

Sr. No.	Practices	Adoption level					
		FA		PA		NA	
		F	%	F	%	F	%
1.	Selection of seeds						
	Mallika	75	62.50	0	0.00	0	0.00
	Bunny	55	45.83	0	0.00	0	0.00
	Vikram-5	33	27.50	0	0.00	0	0.00
	Dr-Brent	20	16.67	0	0.00	0	0.00
2.	Sowing time (May to July 15)	96	80.00	24	20.00	0	0.00
3.	Sowing method						
	Manual dibbling	120	100.00	0	0.00	0	0.00
4.	Seed rate (2.5-3 kg/ha)	89	74.17	31	25.83	0	0.00
5.	Spacing (90x60cm)	42	35.00	78	65.00	0	0.00
6.	FYM application	9	7.50	34	28.33	77	64.17
7.	Chemical fertilizer (NPK kg/ha)	31	25.83	89	74.17	0	0.00
	N(150)	57	47.50	63	52.50	0	0.00
	P(75)	41	34.17	79	65.83	0	0.00
	K(75)	40	33.33	58	48.33	22	18.33
8.	Intercropping	0	0.00	0	0.00	120	100.00
9.	Weeding						
	Hand weeding	82	68.33	38	31.67	0	0
	Herbicide	11	9.17	7	5.83	102	85.00
10.	Leaf reddening (1% MgSO <sub>4</sub> )	20	16.67	54	45.00	46	38.33
11.	Disease control						
	Leafspot (Mancozeb @ 2g/l)	15	12.50	31	25.83	74	61.67
	Cotton rust (copper oxychloride @ 3g/l)	13	10.83	29	24.17	78	65.00
12.	Pest control						
	Sucking pest (Acitamidpride @2.0 ml/l, Trizophos @1.5 ml/l)	34	28.33	65	54.17	21	17.50
13.	Micronutrient (1% MgSO <sub>4</sub> )	25	20.83	22	18.33	53	44.17
14.	Use of green manure (sunhemp)	0	0.00	0	0.00	120	100.00
15.	Use of bio-fertilizer ( <i>Azospirillum</i> )	0	0.00	0	0.00	120	100.00

The information in the parenthesis is as per the recommended package of practices

### Relation of dependent variables of Bt cotton growers with their independent variables:

The result from Table 3 indicated that, adoption level of farmers with respect to recommended practices in Bt cotton crop had positive and significant relationship with their educational level. Acquisition of formal education may also help to interpret ideas in a rational manner, resulting in programmatic decision making. Farming experience had significant relation with adoption level of the respondents. More the farming experience better will be the understanding of recommended practices which leads to higher level of adoption. The land holding was positively and significantly correlated with level of adoption of recommended practices by the Bt cotton growers. The probable reason for this kind of result may be that farmers with larger holdings will have more opportunities and potentialities to try and adopt large number of technological innovations. Annual income of the Bt cotton growers was found to have positive and significant relationship with their adoption level of recommended practices. Income of farmers has influenced the adoption of recommended practices. Mass media significantly related with adoption level of the respondents. This might be because of exposure to different mass media sources like newspapers, radio and television might have helped the respondents to gain recent information, hence farmers has higher level of adoption. The extension contact was found to have positively significant relationship with the adoption level of recommended practices. The relationship between extension participation and adoption of recommended practices farmers was significant. The possible reason for this trend may be that, the farmers who had participated in most of extension activities. Risk orientation was found to be had positive and significant relationship with the adoption of recommended practices. This implies that farmers who had favourable orientation towards management and scientific knowledge would tend to be more willing to adopt the latest technology on their field and risk relates to the extent of pains taken by a farmer to achieve greater success than others. Achievement motivation was positively and significantly correlated with the adoption of recommended practices. Scientific orientations were found to be had positive and significant relationship with the adoption of recommended practices. Farmers with good scientific orientation will try to adopt all the recommended practices of Bt cotton.

### Conclusion:

The quantity of FYM and application of fertilizer, control measures for pests and diseases were adopted by less number of respondents. Since, these practices are crucial for obtaining

**Table 3: Relationship of independent variables with knowledge and adoption**

Independent variables	Knowledge 'r'	Adoption 'r'
Education	0.3185**	0.2957**
Farming experience	0.2167*	0.2110*
Land holding	0.0575NS	0.2112*
Annual income	0.0883NS	0.2101*
Mass media participation	0.2272*	0.2212*
Extension contact	0.3051**	0.2445**
Extension participation	0.3241**	0.2188*
Risk orientation	0.3128**	0.2343**
Achievement motivation	0.2682**	0.2327*
Scientific orientation	0.2273*	0.2010*

r= Correlation co-efficient      NS = Non-significant  
\* and \*\* indicate significance of values at P=0.05 and P=0.01, respectively

higher yield, hence, line departments should consider these aspects and mobilize their system to educate farmers. The study indicated that though the Bt cotton is cultivated by many farmers in the study area, their scientific knowledge and adoption about the crop have found the gaps. The best way to overcome this gap is through vigorously utilization of the scientific expertise of Krishi Vigyan Kendras for conducting regular off campus training for the farmers and conducting farmers field schools would certainly help to bridge these gaps. Much emphasis thus should be given for such extension approaches by the line departments.

There is significant relationship between dependent and independent variables of the respondents, hence strategies are formed to improve the extent of adoption of Bt cotton production practices by farmers in the study area.

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