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Farmers Attitude towards Bt cotton Cultivation in Andhra Pradesh

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ABSTRACT

A study was conducted to know the farmers attitude towards the environmental, economic and social issues related to Bt cotton cultivation. One hundred and eighty respondents were selected from Guntur, Adilabad and Kurnool Districts of Andhra Pradesh for the study. The results revealed that majority of the farmers had favorable attitude towards Bt cotton cultivation. There was no significant difference among the small, medium and big farmers regarding attitude towards Bt cotton cultivation. Majority of the farmers possessed favourable attitude with the performance of Bt cotton crop in terms of yield and net income as more than 50 per cent less insecticides are used in Bt cotton cultivation.

Key words : Attitude, Bt cotton, Content analysis.

Cotton, popularly known as 'White Gold' is an important premier commercial crop of India. Bt cotton was the first and only genetically modified crop introduced for commercial cultivation in India during 2002 to manage the bollworms in cotton which were causing severe distress for cotton farmers .After introduction of Bt cotton in Andhra Pradesh, the productivity of lint has jumped from a meager 418 kg/ha in 2002-03 to touch 596 kg/ha during 2009-10. Where as in China average cotton lint yield was 1265 kg/ha. So, there is a need for overcoming the gap between the potential yield and realized yield. This gap can be known by probing deeper into the cultivation aspects of the crop. Moreover, the cultivation aspects of the farmers are very much related to the attitude of the farmers. It was therefore felt necessary to study the attitude of farmers towards Bt cotton cultivation.

MATERIAL AND METHODS

The present study was conducted with an expost-facto research design to know the farmers attitude towards Bt cotton cultivation in Andhra Pradesh.Three districts namely Guntur, Adilabad and Kurnool representing Andhra, Telangana and Rayalaseema regions of Andhra Pradesh respectively were selected for the study. Guntur, Adilabad and Kurnool districts were purposively selected based on highest area under Bt cotton cultivation in their respective regions during 2009-2010.Two mandals from each district and three villages from each mandal were selected by using simple random sampling technique.From each village ten farmers comprising marginal, small and big farmers were selected by following proportionate stratified random sampling method. Thus, a total number of 180 respondents were selected from 18 villages. Data was collected with the help of pre-tested interview schedule.

RESULTS AND DISCUSSION

The findings of the study are presented as follows

1. Distribution of respondents based on their attitude on the Bt cotton cultivation technologies.
2. Differences in level of attitude of farmers with respect to Bt cotton cultivation technologies
3. Item analysis of attitude of farmers on the knowledge level of farmers with respect to Bt cotton cultivation technologies

1. Distribution of respondents based on their attitude on the Bt cotton cultivation technologies

Based on the attitude score, the respondents were grouped into three categories and it is evident from table 1 that in case of small farmers 63.64 per cent of the respondents possessed favourable attitude towards Bt cotton cultivation followed by less (19.32%) and more (17.04%) favourable attitude towards Bt cotton cultivation.

Regarding medium farmers, majority (67.35%) of the respondents possessed favourable attitude followed by more (18.36%) and less

(14.29%).With respect to large farmers 65.00 per cent of the farmers possessed favourable attitude followed by more (20.94%) and less (13.95%) favourable attitude towards Bt cotton cultivation

Further, it was revealed that all the farmers put together it was found that 65.00 per cent of the respondents were having favourable attitude, 18.34 per cent had more favourable attitude and 16.66 per cent of the respondents had less favourable attitude.

2. Differences in level of attitude of farmers with respect to Bt cotton cultivation technologies

The data regarding the attitude of different categories of farmers were analysed by applying analysis of variance test to find out the differences in their attitude scores. The results were present in table 2.

Null hypothesis:

There will be no significant difference among the mean attitude score of farmers in three groups.

Empirical hypothesis:

There will be significant difference among the mean attitude score of farmers in three groups.

The table 2 reveals that calculated F value was less than the table value. Therefore, the null hypothesis was accepted and empirical hypothesis was rejected and concluded that means of three categories of farmers did not differ significantly. Therefore, it could be concluded that the attitude of farmers towards Bt cotton cultivation technologies was more or less same in all the sample group of farmers.

3. Content analysis of attitude of farmers towards Bt cotton cultivation technologies

To gain more insight on the attitude of the respondents on Bt cotton cultivation technologies, content analysis was carried out. The environmental, economic and social issues related to attitude towards adoption of Bt cotton cultivation technologies are furnished in the table 3.The attitude scale comprised of 22 statements selected for the study. Analysis of individual statement could be useful for knowing the reactions of the farmers on specific aspects of improved agricultural technologies.

A. Attitude of Bt cotton farmers on environmental issues

Majority (86.11%) of the respondents showed favourable attitude with the statement "Bt cotton ensured more than fifty percent reduction in the use of pesticides", where as 11.11 per cent of the respondents showed unfavourable attitude and 2.77 per cent were undecided to the statement.It could also be understood from the table 3 that 83.89 per cent of the respondents had disagreed to the statement "I cannot recommend other farmers to take up Bt cotton cultivation". While 13.33 per cent of the respondents agreed and 2.77 per cent of the respondents were undecided to the statement. Majority (74.44%) of the respondents had disagreed with the statement "There is no need to maintain refuge crop around the Bt cotton field", while 18.33 per cent of the respondents agreed to the statement, 7.20 per cent were undecided to the statement.Majority (74.44%) of the farmers had disagreed with the statement "Bt cotton is a panacea for all ills of cotton", whereas 19.44 per cent of the respondents agreed to the statement, and 6.11 per cent of the respondents were undecided to the statement.

Majority (70.56%) of the respondents had agreed with the statement "Bt cotton technology is producing the desired effect and so it may not be replaced by a new technology", while 3.33 per cent of the respondents were undecided and 26.11 per cent disagreed with the statement. Majority (63.33%) of the respondents had agreed to the statement "Bt cotton technology facilitates increasing the incidence of sucking pests", while 31.11 per cent respondents disagree with the statement and 5.55 per cent were undecided to the statement. Majority (62.22%) of the respondents agreed with the statement "The continuous cultivation of Bt cotton reduces soil fertility and reduces yields of the succeeding crop", while 20.00 per cent of the respondents disagree with the statement and 17.77 per cent of them were undecided to the statement. A 57.78, 22.78 and 19.44 per cent of the respondents had disagreed, agreed and undecided respectively with the

Table 1. Distribution of the respondents according to their attitude towards Bt cotton cultivation technologies.

S.No	Category	Small farmers (n=88)		Medium farmers (n=49)		Large farmers (n=43)		Total (n=180)	
		F	%	F	%	F	%	F	%
1	Less favourable attitude	17	19.32	7	14.29	6	13.95	30	16.66
2	Favourable attitude	56	63.64	33	67.35	28	65.00	117	65.00
3	More favourable attitude	15	17.04	9	18.36	9	20.94	33	18.34
	Mean	64.64		67.42		89.86			
	SD	14.38		14.22		14.74			

Table 2. Differences in attitude scores of farmers in respect of Bt cotton cultivation technologies.

Source of variation	D.F	Sum of squares	Mean sum of squares	F .Cal value	F. Tab value
Between samples	2	825.70	412.85	1.983 NS	3.40
Within samples	177	36851.24	208.19		

NS= Non- significant

statement " I can accept Bt technology for cotton but not for other food crops". Majority (57.22%) of the respondents had agreed with the statement "Bt cotton technology is not working effectively under rain-fed situation", while 38.89 per cent of the respondents were disagreed and 3.88 per cent were undecided. Similarly 51.67, 11.11 and 37.22 per cent of the respondents agreed, undecided and disagreed respectively with the statement "There is a apprehension that cattle grazing the Bt cotton stubbles will be harmful to cattle". Majority (46.66%) of the respondents were undecided with the statement "Stem application of monocrotophos is not a feasible technology for control of sucking pests in Bt cotton", where as 32.22 per cent of the respondents disagreed with the statement and 21.11 per cent of them agreed with the statement.40.56, 39.44 and 20.00 per cent of the respondents were agreed, undecided and disagreed respectively with the statement" Bt cotton technology is not a good tool for integrated pest management practices".

B. Attitude of Bt cotton farmers on economic issues

An observation of the results of the table 3 reveals that majority (86.67%) of the farmers had agreed to the statement "I have satisfied with the performance of Bt cotton hybrids", while 13.33 were disagreed to the statement.Majority (82.22%) of the respondents had agreed with the statement "Application of phosphatic fertilizer as basal to Bt cotton crop is not necessary.", while 12.22 per cent of the respondents disagreed to the statement and 5.55 per cent of them were undecided to the statement.Majority (77.22%) of the farmers had agreed to the statement that "the Bt cotton cultivation gives more net profit to the farmers than non Bt cotton", while 0.55 per cent of the respondents were undecided and 22.22 per cent disagreed to the statement.

Majority (61.67%) of the respondents disagree to the statement "Soil testing before the use of fertilizers is not advantageous", while 36.67 per cent of the respondents agreed, 1.66 per cent of the respondents were undecided with the statement. Nearly sixty per cent of the respondents had agreed with the statement "Bt cotton is necessary to improve the cotton production in Andhra Pradesh", while 10.00 per cent of the respondents were disagreed and 32.22 per cent were undecided. Majority(55.00%) per cent of the farmers had agreed to the statement "Bt cotton

Table 3. Statement wise percentage of respondents indicating attitude towards Bt cotton cultivation technologies.

N= 180

S No	Statements	Favourable attitude			Neutral	Unfavourable attitude		
		SA	A	Total	UD	DA	SDA	Total
A.	**Attitude of Bt cotton farmers on environmental issues**							
1	Bt cotton ensured more than fifty percent reduction in the use of pesticides	51 (28.33)	104 (57.78)	155 (86.11)	5 (2.78)	13 (7.22)	7 (3.89)	20 (11.11)
2	I cannot recommend other farmers to take up Bt cotton cultivation	5 (2.78)	19 (10.56)	24 (13.33)	5 (2.78)	24 (13.33)	127 (70.56)	151 (83.89)
3	There is no need for maintain refuge crop around the Bt cotton field	6 (3.33)	27 (15.00)	33 (18.34)	13 (7.20)	66 (36.66)	68 (37.78)	134 (74.44)
4	Bt cotton is a panacea for all ills of cotton	9 (5.00)	26 (14.44)	35 (19.44)	11 (6.12)	67 (37.22)	67 (37.22)	134 (74.44)
5	Bt cotton technology is producing the desired effect and so it may not be replaced by a new technology.	38 (21.11)	89 (49.44)	127 (70.56)	6 (3.33)	21 (11.66)	26 (14.44)	47 (26.11)
6	Bt cotton technology facilitates increasing the incidence of sucking pests.	16 (8.89)	98 (54.44)	114 (63.33)	10 (5.55)	24 (13.33)	32 (17.78)	56 (31.12)
7	I can accept Bt technology for cotton but not for food crops	12 (6.67)	29 (16.11)	41 (22.78)	35 (19.44)	44 (24.44)	60 (33.33)	104 (57.78)
8	The continuous cultivation of Bt cotton reduces soil fertility and reduces yields of the succeeding crop	20 (11.11)	92 (51.11)	112 (62.22)	32 (17.78)	16 (8.90)	20 (11.11)	36 (20.00)
9	Bt cotton technology is not working effectively under rain-fed situation.	26 (14.44)	77 (42.78)	103 (57.22)	7 (3.88)	18 (10.00)	52 (28.89)	70 (38.90)
10	There is a apprehension that cattle grazing the Bt cotton stubbles will be harmful to cattle	29 (16.10)	64 (35.56)	93 (51.67)	20 (11.11)	43 (23.88)	24 (13.33)	67 (37.22)
11	Stem application of monocrotophos is not a feasible technology for control of sucking pests in Bt cotton.	9 (5.00)	29 (16.11)	38 (21.12)	84 (46.66)	33 (18.33)	25 (13.89)	58 (32.22)
12	Bt cotton technology is not a good tool for integrated pest management practices.	4 (2.22)	69 (38.33)	73 (40.56)	71 (39.44)	29 (16.11)	7 (3.89)	36 (20.00)
B	**Attitude of Bt cotton farmers on economic issues**							
13	I have satisfied with the performance of Bt cotton hybrids	52 (28.90)	104 (57.77)	156 (86.67)	0 (0.00)	9 (5.00)	15 (8.33)	24 (13.33)
14	Bt cotton cultivation is the best solution for removing indebtedness.	42 (23.33)	57 (31.67)	99 (55.00)	1 (0.55)	37 (21.00)	43 (23.89)	80 (44.45)
15	Bt cotton is necessary to improve the cotton production in Andhra Pradesh	21 (11.66)	83 (46.11)	104 (57.78)	58 (32.22)	9 (5.00)	9 (5.00)	18 (10.00)

Table 3. cont....

16	Soil testing before the use of fertilizers is not advantageous	15 (8.33)	51 (28.33)	66 (36.67)	3 (1.66)	72 (40.00)	39 (21.67)	111 (61.67)
17	The Bt cotton cultivation gives more net profit to the farmers than Non Bt cotton.	33 (18.33)	106 (58.89)	139 (77.22)	1 (0.56)	20 (11.11)	20 (11.11)	40 (22.22)
18	Compare to non Bt cotton , Bt cotton requires wider spacing for getting more yields	22 (12.22)	73 (40.56)	95 (52.78)	0 (0.00)	50 (27.77)	35 (19.44)	85 (47.22)
19	Application of phosphatic fertilizer as basal to Bt cotton crop is not necessary.	48 (26.66)	100 (55.56)	148 (82.22)	10 (5.56)	4 (2.22)	18 (10.00)	22 (12.22)
C	**Attitude of Bt cotton farmers on social issues**							
20	Bt cotton technology facilitates for reduction of stress among farmers that was caused by cotton boll worms	45 (25.00)	70 (38.89)	115 (63.89)	0 (0.00)	22 (12.22)	43 (23.89)	65 (36.11)
21	Bt cotton technology facilitates for strengthening of public and private partnership in development of genetically modified crops.	13 (7.22)	53 (29.44)	66 (36.67)	9 (5.00)	78 (43.33)	27 (15.00)	105 (58.33)
22	Adoption of Bt cotton cultivation practices is also feasible for marginal and small farmers	29 (16.11)	88 (48.89)	117 (65.00)	3 (1.66)	20 (11.11)	40 (22.22)	60 (33.33)

A : Agree, SA : Strongly agree, UD : Undecided, DA : Disagree, SDA : Strongly disagree

cultivation is the best solution for removing indebtedness", while 0.55 per cent of the respondents were undecided and 44.44 per cent of the respondents disagreed to the statement. Similarly 52.78 and 47.22 per cent of the respondents had agreed and disagreed respectively with the statement "compare to non Bt cotton, Bt cotton requires wider spacing for getting more yields".

C. Attitude of Bt cotton farmers on social issues

A 65.00, 33.33and1.66 per cent of the respondents agreed, disagreed and undecided respectively with the statement "adoption of Bt cotton cultivation practices is also feasible for marginal and small farmers". On the same lines ,63.89 and 36.11 per cent of the respondents agreed and disagreed respectively with the statement "Bt cotton technology facilitates for reduction of stress among farmers that was caused by cotton bollworms".Majority (58.33%) of the respondents had disagreed with the statement "Bt cotton technology facilitates for strengthening of public and private partnership in development of genetically modified crops", while 36.67 per cent of the respondents agreed to the statement and 5.00 per cent were undecided with the statement.

DISCUSSION

An appraisal of the results of the table 1 indicate that majority of the farmers had favourable to more favourable attitude towards Bt cotton technologies. The reasons for such favourable attitude might be due to the fact that the farmers might have been impressed with the performance of Bt cotton in terms of yield, net income, feasibility and practicability of Bt cotton technology.

Attitude is prelude for adoption. So, the situation can effectively be utilized by the extension personnel in dissemination of information on Bt cotton cultivation. For this, there is an urgent need to organize effective training programmes and demonstrations at village level to create awareness regarding advantages of Bt cotton cultivation. An appraisal of the content analysis of 22 attitude statements as shown in the table 3 suggest that

the majority of the farmers had more favourable attitude on environmental issues related to the Bt cotton cultivation practices like Majority of the farmers had favourable attitude on the statements such as "Bt cotton ensured more that 50 per cent reduction in the use of insecticides", These findings are in close conformity with the earlier findings of Huang *et al,* (2003) and Qaim,(2003)

A great majority of the respondents rejected the notion that "I cannot recommend other farmers to take up Bt cotton cultivation". After having experience of Bt cotton cultivation farmers felt that cultivation of Bt cotton was profitable. So, there is no problem to recommend other farmers to take up Bt cotton cultivation. There were also some farmers who thought that "There is no need to maintain refuge crop around the Bt cotton field". They opined that growing of refuge crop interferes with the inter cultivation operations and additional sprayings for control of bollworms on refuge crop was needed.

Majority of the farmers disagreed with the statement that "Bt cotton is a panacea for all ills of cotton. After introduction of Bt cotton, the removal of pesticides umbrella for bollworms resulted in the progressing of mealy bugs and other sucking pests, which were otherwise suppressed with the insecticides. In addition to sucking pests, nutritional disorders, susceptibility of Bt cotton to drought than non Bt cotton are the other problems. So, farmers perceived that Bt cotton is not a penacea for all ills of cotton. Majority of the respondents rejected the notion that "Soil testing before the use of fertilizers in not advantageous". Majority of the respondents opined that Bt cotton technology facilitates increasing the incidence of sucking pests .

A few of the respondents rejected the notion that 'The continuous cultivation of Bt cotton reduces soil fertility and reduces yields of the succeeding crop" majority of the farmers opined that the negative effects from Bt cotton cultivation are largely unknown because there is no proper authentic information regarding the positive and negative effects of Bt cotton cultivation on human, flora and fauna. Majority farmers agreed to the statement that "I can accept Bt technology for cotton but not for other food crops". The respondents opined that use of Bt cotton technology in food crops may be harmful for health. However, 22.78 per cent of the respondents denied the statement.

Fifty per cent of the respondents felt that Bt cotton technology is not working effectively under dry conditions. Farmers opined that the existing Bt hybrids performance is not good under dry conditions. However, under irrigated dry conditions, Bt cotton performance was good. Nearly fifty per cent of the respondents agreed to the statement that there is an apprehension that cattle grazing the Bt cotton stubbles will be harmful to cattle. Farmers opined that cattle grazing the leaves and branches of cotton plants at vegetative stage is creating stomach upset in some cattle.

Majority of the respondents undecided with the statement "Stem application of monocrotophos is not a feasible technology for control of sucking pests in Bt cotton". Lack of awareness regarding stem application of monocrotophos might be the main reason for neutral attitude with the statement and some of the farmers opined that stem application technique involves drudgery and also involves more labour cost compared to spraying. Majority of the respondents were undecided with the statement that "Bt cotton technology is not a good tool for integrated pest management practices". It might be due to the fact that after introduction of Bt cotton, the sucking pests incidence was increasing year by year.

A. Attitude of Bt cotton farmers on economic issues

"I am satisfied with the performance of Bt cotton" "Bt cotton cultivation is the best solution for removing indebtedness and "Bt cotton cultivation gives more net profit to the farmers than non-Bt cotton". It appears that after introduction of Bt cotton cultivation, farmers could able to get higher yields and there by higher returns compared to non Bt cotton. Good remunerative price for Bt cotton could be the another most important cause for favourable attitude of the farmers towards Bt cotton cultivation.These findings are in conformity with those of David and Sai (2002) and Yang *et.al.,*(2002).

There were still farmers who held a strong belief that "Application of phosphatic fertilizer as basal to Bt cotton crop is not necessary". So, there is an urgent need to conduct research on "Influence

of phosphotic fertilizers as top dressing on yields of Bt cotton" .Majority of the respondents accepted the notion that Bt cotton is necessary to improve the cotton production in Andhra Pradesh. Majority of the farmers felt that as compared to non Bt cotton, Bt cotton requires wider spacing for getting more yields. 47.22 per cent of the farmers felt that whether it is Bt or Non Bt cotton, spacing is decided based on soil type and availability of irrigation facilities. So, there is no need to maintain closer spacing in Bt cotton.

B. Attitude of farmers on social issues

A 63.89 per cent of the respondents felt that "Bt cotton technology facilitates for reduction of stress among farmers that were caused by bollworms". Farmers opined that after introduction of Bt cotton they feel comfortable with the cultivation of Bt cotton due to non occurrence of bollworms of cotton. Similarly, 58.33 per cent of the respondents disagree that "Bt cotton technology facilitates for strengthening of public and private partnership in development of genetically modified crops. Farmers opined that public has to do lot of effort to develop eco-friendly genetically modified crops otherwise private wing takes the advantage and they decides the marketing of the seeds of genetically modified crops. So, the government should take stringent measures to develop public Bt cotton hybrids. Sixty five per cent of the respondents agreed with the statement "Adoption of Bt cotton cultivation practices is also feasible for marginal and small farmers." Farmers felt that there was no problem with adoption of Bt cotton cultivation practices irrespective of category of farmers because it was providing same benefit for all the farmers.

Majority of the respondents had favourable attitude followed by less and more favourable attitude towards Bt cotton cultivation. Majority of the farmers possessed favourable attitude with the performance of Bt cotton crop in terms of yield and net income and more than fifty per cent reduction in use of insecticides.

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