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Farmers' perception on benefits of growing Bt cotton

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ABSTRACT

The present study was conducted to understand the socio-economic characteristics of Bt cotton growers and their perception of risks and benefits. The data were collected from 60 Bt cotton growers of Harapanahalli and Jagalur Taluks of Davanagere district by applying random sampling technique. Results revealed that most of the Bt cotton growers were middle aged (58.33%), having medium education (70.00%), medium land holding (41.67%), low annual income (40.00%), low social participation (83.33%), medium innovative proneness (71.67%), low extension contact (55.00%), low mass media exposure (70.00%), medium scientific orientation (41.67%) and medium level of experience in Bt cotton cultivation (81.67%). With respect to perception of risks superiority of Bt cotton compared to conventional cotton was considered and cent per cent of the respondents expressed that there was a reduction in the boll worm incidence to the extent of 92.83 per cent and also cent per cent of them perceived that Bt cotton cultivation had resulted in reduction of number of plant protection chemical sprayings to a tune of 68.25 per cent as compared to conventional cotton. Majority of them agreed that Bt cotton was compatible with existing farming practices of the locality.

Keywords: Bt cotton; farmers' perception; benefits; cultivation

INTRODUCTION

Global demand for food is rising because of the growing world population and declining arable land. At the same time food and agricultural systems have to respond to several changes such as increasing international competition, globalization and rising consumer demands for improved food quality, safety, health enhancement and convenience (Ahuja and Jotwani 2010).

The major development in 2002 featured the application of biotechnology to crops which led to the approval and

commercialization of the first biotech crop in India featuring Bt gene in hybrid cotton which confers resistance to the critically important lepidopteron insect pests such as cotton bollworm.

The experience of Bt cotton production in India is a outstanding story which has clearly demonstrated the enormous impact that can be achieved by adopting GM crops. Despite the intensive actions of activists Bt cotton has achieved unparalleled success in India simply due to the multiple and significant benefits it consistently delivers to farmers and it is reflected in the unprecedented 125 fold increase in Bt cotton area between 2002 and 2007 (Choudhary and Gaur 2009).

The present study was conducted in Davangere district of Karnataka to understand the socio-economic characteristics of the farmers and their perception of risks and benefits of cultivating Bt cotton.

METHODOLOGY

The present study was conducted in Davangere district of Karnataka situated in both northern and central dry zone of Karnataka. Davanagere district was purposively selected based on increasing trend in cotton area and production during past three years and also substantial number of farmers adopting the Bt cotton cultivation. Out of six Taluks in the district, Harapanahalli and Jagalur Taluks were having highest area under Bt Cotton (1280 and 1251 ha respectively). Three villages having highest area under Bt cotton were selected from each Taluk. From each village 10 Bt Cotton growers were selected randomly by using simple random sampling technique. Thus in total 60 Bt cotton growers were selected as respondents for the study. The data were collected on socio-economic characteristics of Bt cotton growers and their perception of risks and benefits using pre-tested schedule. The data were analyzed with suitable statistical tools.

Perception in the context of present study refers to the understanding of the risks and benefits of production and marketing of Bt cotton by the farmers. Assessing the perception of individuals about Bt cotton in terms of its superiority benefits and risks give an idea to the extension workers as well as the scientists to focus on their investigations on promoting technologies which have similar benefits to the farmers and also to overcome the risks involved in Bt cotton cultivation. Further assessing the perception about benefits and risks helps in determining the success of any technology.

RESULTS and DISCUSSION

Profile of the Bt cotton growers in three selected Taluks of Davanagere district

Data in the Table 1 reveal the socio-economic status of the Bt cotton growers in the study area. More than half

Table 1. Profile of the Bt cotton growers in three selected Taluks of Davanagere district (n= 60)

Variable	Category	Frequency	Percentage	Mean	SD
Age (years)	Young (<35)	14	23.33		
	Middle (35-55)	35	58.33	44.17	12.84
	Old (>55)	11	18.33		
Education	Low (<2)	9	15.00		
	Medium (2-4)	42	70.00	2.82	1.41
	High (>4)	9	15.00		
Land holding	Low (<196 score)	23	38.33		
	Medium (196 to 660 score)	25	41.67	415.83	440.28
	High (>660 score)	12	20.00		
Annual	Low(<17,143)	24	40.00		
income (Rs)	Medium (17,143 to 43,223)	22	36.67	30,183	26080
	High (>43,223)	14	23.33		
Social participation	Low (<1)	50	83.33		
	Medium (1-2)	1	1.67	0.80	1.96
	High (>2)	9	15.00		
Innovative proneness	Low (<6)	7	11.67		
	Medium (6 to 7)	43	71.67	6.72	1.03
	High (>7)	10	16.67		
Extension contact	Low (<1.17)	33	55.00		
	Medium (1.17 to 5.36)	11	18.33	3.27	4.19
	High (>5.36)	16	26.67		
Mass media	Low (<3.1)	42	70.00		
exposure	Medium (3.1 to 5.43)	5	8.33	4.27	2.33
	High (>5.43)	13	21.67		
Scientific orientation	Low (<12.41)	23	38.33		
	Medium (12.41 to 13.45)	25	41.67	12.93	1.04
	High (>13.45)	12	20.00		
Training undergone	Nil	60	100.00		
	At least one training	0	0.00		
Experience	Low (<2)	7	11.67		
in Bt cotton	Medium (2-3)	49	81.67	2.50	0.79
cultivation	High (>3)	4	6.67		

(58.33%) of the respondents belonged to middle age group, followed by young (23.33%) and old (18.33%). In general the farmers of middle age are enthusiastic and have more work efficiency. They also work with a sense of commitment and involvement. The results are in line with the findings of Yang et al (2005).

It was observed that majority (70.00%) of the respondents had medium level of education. Percentage of the respondents in low and high education categories was 15.00 which could be the result of a common social environment. A considerable percentage (41.67%) of the respondents had medium level of land holding followed by low land holding (38.33%). About 20.00 per cent of the respondents had high level of land holding. The results are in consonances with the findings of Qayum and Sakkari (2003). About 40.00, 36.67 and 23.33 per cent of the respondents were having the low, medium and high level of annual income respectively. Majority (83.33%) of the respondents had low while 15.00 per cent of the respondents had high level of social participation. This may be due to the conservative nature of the rural families and lack of motivation, time, opportunities, awareness and social mobility.

Majority (71.67%) of the respondents had medium level of innovative proneness followed by high innovative proneness (16.67%). This could be reason that the respondents had adopted a new technology like Bt cotton at the initial years of its release itself. More than half (55.00%) of the respondents had low extension contact followed by the 26.67 per cent of the respondents having high extension contact. The probable reasons for the low level of extension contact could be the lack of awareness, mobility and trust on extension personnel.

Majority (70.00%) of the respondents had low and 21.67 per cent had high mass media exposure. 41.67 per cent of the respondents had medium level of scientific orientation followed by 38.33 per cent having low and 20.00 per cent having high scientific orientation. The scientific orientation comes with the education and repeated contact with the experts. As majority of the respondents had medium education and low extension contact it might have resulted in the medium level of scientific orientation.

It is very interesting to observe that, none of the respondents had undergone any training on cotton cultivation during the last three years even for a single day. The probable reason for this might be the poor extension work in the study area by the developmental department or it could also be because of the lack of interest and time in the farming community. The study revealed that majority (81.67%) of them had medium, 11.67 per cent had low and only 6.67 per

cent had high level of experience in Bt Cotton cultivation.

Farmers' perception about superiority of Bt cotton over conventional cotton

The superiority of Bt cotton refers to how best it was performing as compared to the conventional cotton in terms of yield, quality, costs and other operations involved. The results in Table 2 reveal that cent per cent of the respondents approved that there was reduction in the boll worm incidence to an extent of 92.83 per cent and also cent per cent of them perceived that Bt cotton cultivation had resulted in reduction of number of plant protection chemical sprayings to the tune of 68.25 per cent. A majority (91.67%) of the respondents reported that there was a reduction in the cost incurred towards pesticide application to an extent of 62.64 per cent and also majority (80.00%) of them perceived that there was a reduction in the labour costs to a tune of 47.40 per cent. With respect to cost of production majority (81.67%) of the respondents perceived that there was a reduction in the cost of production to a tune of 27.35 per cent. The findings reveal that Bt cotton was effective in controlling boll worm incidence as intended. 60.00 and 73.33 per cent of the respondents perceived that there was no difference between the Bt cotton and conventional cotton with respect to sucking pest incidence and disease incidence respectively. The probable reason behind this is that Bt cotton technology was intended to control only boll worm incidence which was most devastating pest of cotton. About half (53.33%) of the respondents revealed that there was a reduction in the yield of Bt cotton as compared to the conventional cotton to the tune of 45.63 per cent whereas one third (33.33%) of them expressed that there was an increase in the yield of Bt cotton as compared to the conventional cotton to the extent of 35.00 per cent. This divisive perception among the respondents might be based on the yield received by the individuals during the study year as some of the respondents obtained good yield and others got a poor yield. About 65.00 per cent of them expressed that there was an increase in the market price of Bt cotton to an extent of 23.85 per cent as compared to conventional cotton. This was mainly because of the better quality of Bt cotton compared to conventional cotton as former was less infested by boll worms and the lint was not damaged by the pest. These findings are in line with the findings of Gandhi and Namboodiri (2006) and Arshad et al (2007).

Farmer's perception about benefits of cultivating Bt cotton

Majority (98.33%) of the respondents fully agreed that Bt cotton required less number of sprays than non-Bt cotton (Table 3). Similarly majority (86.67%) of them partially agreed that Bt cotton was more profitable than non-Bt cotton followed by Bt cotton quality was good compared to non-Bt cotton (80.00%).

Table 2. Farmers' perception about superiority of Bt cotton compared to conventional cotton

Superiority parameters of Bt cotton	Farmers' perception on increasing trend of the parameters on Bt cotton		Farmers' perception on decreasing trend of the parameters on Bt cotton		No difference between increasing/ decreasing of parameters on Bt cotton
	Frequency	Mean per cent Increase	Frequency	Mean per cent decrease	Frequency
Boll worm incidence	0 (0.00)	0.00	60 (100.00)	92.83	0 (0.00)
Sucking pests incidence	10 (16.67)	32.00	14 (23.33)	32.86	36 (60.00)
Disease incidence	2 (3.33)	20.00	14 (23.33)	32.86	44 (73.33)
# Chemical sprays	0 (0.00)	0.00	60 (100.00)	68.25	0 (0.00)
Pesticide cost	0 (0.00)	0.00	55 (91.67)	62.64	5 (8.33)
Labour cost	0 (0.00)	0.00	48 (80.00)	47.40	12 (20.00)
Bt cotton yield over conventional cotton	20 (33.33)	35.00	32 (53.33)	45.63	8 (13.33)
Cost of production	5 (8.33)	38.00	49 (81.67)	27.35	6 (10.00)
Market price	39 (65.00)	23.85	5 (8.33)	20.00	16 (26.67)

Figures in the parentheses are per cent values

Table 3. Farmers' perception about benefits of cultivating Bt cotton over non-Bt cotton (n= 60)

Statement	Fully agree		Partially agree		Disagree		Mean perception score
	Frequency	%	Frequency	%	Frequency	%	
Requires less number of sprays	59	98.33	0	0.00	1	1.67	2.97
Compatible with existing farming practices of the locality	54	90.00	5	8.33	1	1.67	2.88
Fetches higher price in market	47	78.33	13	21.67	0	0.00	2.78
Pest incidence is less	43	71.67	14	23.33	3	5.00	2.67
More environmental friendly	43	71.67	14	23.33	3	5.00	2.67
Easy to cultivate	34	56.67	25	41.67	1	1.67	2.55
Lower cost of insecticides	34	56.67	22	36.67	4	6.67	2.50
Better quality cotton	8	13.33	48	80.00	4	6.67	2.07
Saves labour costs	8	13.33	46	76.67	6	10.00	2.03
More profitable	0	0.00	52	86.67	8	13.33	1.87
Higher yield	8	13.33	19	31.67	33	55.00	1.58
Reduced dependence on credit	0	0.00	13	21.67	47	78.33	1.22

Majority of the respondents fully agreed that Bt cotton was compatible with existing farming practices of the locality (90.00%). This could be mainly because Bt cotton doesn't require any special attention or any special operations and it can be cultivated as that of any other conventional cotton varieties.

It was also found that majority (78.33%) of the Bt cotton growers disagreed for the statement 'Bt cotton reduces dependence on credit'. This might be due to the mindset of the farmers towards credit. About 55.00 per cent of them disagreed with the statement 'Bt cotton yields more than the conventional cotton'.

These findings were in line with the partial findings of Yang et al (2005), Gandhi and Namboodiri (2006), Arshad et al (2007) and Peshin et al (2007).

Distribution of the respondents based on their perception about benefits of Bt cotton cultivation

According to the distribution of the respondents based on their scores of perception of benefits of Bt cotton cultivation majority (53.33%) had medium, 33.33 per cent had low and only 13.33 per cent of the respondents had high level of perception regarding the benefits of Bt Cotton cultivation (Table 4).

Relationship of the selected independent variables of the Bt cotton growers with the perception of benefits of Bt cotton cultivation

The results in the Table 5 reveal that there was a positive and significant relationship of education, scientific orientation and experience of the respondents with their perception of benefits of Bt cotton cultivation. The variables such as innovative proneness, extension contact and mass media exposure of the respondents were found to be positively and significantly related with their perception of benefits of Bt cotton cultivation.

Mass media are known for their accuracy, consistency, timeliness, completeness, conciseness, reliability, accessibility and objectivity. Hence an individual who had higher mass media exposure has better perception of benefits and risks involved in any technology. This could be the reason for positive relationship of mass media with perception of Bt cotton growers.

Contribution of independent variables on perception of Bt cotton growers regarding benefits of Bt cotton cultivation

Table 6 reveals that 81.00 per cent of the variation on the level of perception of benefits could be explained by ten independent variables considered for the study. The 'F' value (11.54) for the

Table 4. Distribution of the respondents based on their perception about benefits of Bt cotton cultivation (n= 60)

Category	Frequency	Percentage	Mean
Low (<26)	20	33.33	23.70
Medium (26-30)	32	53.33	29.03
High (>30)	8	13.33	33.00
Total	60	100.00	28.58

SD= 3.69

Table 5. Relationship of the selected independent variables of the Bt cotton growers with perception of benefits of Bt cotton cultivation (n= 60)

Independent variable	Correlation coefficient
Age	0.19^{NS}
Education	0.38*
Land holding	0.22^{NS}
Annual income	0.13^{NS}
Social participation	0.20^{NS}
Innovative proneness	0.27
Extension contact	0.31
Mass media exposure	0.33
Scientific orientation	0.41*
Experience in Bt Cotton cultivation	0.36**

*Significant at 5% level of significance, **Significant at the 1% level of significance, ^{NS}Non-significant

regression analysis model indicates high level of significance at 0.01 level of probability. Further it could be noticed that out of ten independent variables viz education, mass media exposure and experience in Bt cotton cultivation were highly significant at one per cent level followed by innovative proneness, extension contact and scientific orientation were significant at five per cent level in explaining the variation of perception of benefits of cultivating Bt Cotton. The possible reason might be that socio-economic variables are the deciding factors of the perception level of benefits.

CONCLUSION

It has been observed that most of the Bt cotton growers in the study area had

Table 6. Multiple regression analysis of perception of Bt cotton growers regarding benefits of Bt cotton cultivation with their independent variables (n= 60)

Independent variable	Beta	SE	't' value
Age	1.62	1.51	1.07^{NS}
Education	1.65	0.59	2.81*
Land holding	0.98	1.07	0.92^{NS}
Annual income	1.26	0.70	1.80^{NS}
Social participation	1.65	1.28	1.29^{NS}
Innovative proneness	0.97	0.47	2.08
Extension contact	1.04	0.48	2.18
Mass media exposure	0.86	0.23	3.67*
Scientific orientation	0.73	0.31	2.35*
Experience in Bt cotton cultivation	1.27	0.43	2.92**

R^2= 0.81 F= 11.54**

*Significant at the 5% level of significance

**Significant at the 1% level of significance

^{NS}Non-Significant

low level of social participation, extension contact, mass media exposure and none of them had undergone training. Hence the developmental departments have to organize training programmes at different levels. Majority of the farmers had favourable perception about Bt cotton in terms of reduction in bollworm incidence and number of pesticide applications. The scientists or breeders in both public as well as private sector should try to develop new Bt cotton hybrids which can overcome these risks.

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