Adoption Analyses of Bt Cotton Production Technologies by Bhoochetana Beneficiaries in Hyderabad Karnataka Region

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A B S T R A C T

The research study was conducted on impact of training programme on knowledge, perception and attitude of stakeholders towards Bhoochetana programme. The Raichur, Koppal and Bellary districts were purposively selected based on their maximum area under cotton cultivation. The random sampling procedure is being used to identify 180 beneficeries. The ex-post –facto research design is used for the study. It was observed that 38.89 per cent of beneficiaries belonged to medium adoption category, followed by low (27.22 %) and high (33.89 %) adoption categories. Majority (83.33 %) of the beneficiaries adopted Mallika followed by Bunny (54.44 %), Vikram (52.78 %) and Dr-Brent (47.27 %). Majority (80.00 %) of the beneficiaries had sown the crop as per the recommended time, while only 20.00 per cent of beneficiaries had delayed the sowing of the crop. Cent per cent of the beneficiaries followed the manual dibbling method of sowing. Majority (77.22 %) of the beneficiaries fully adopted the seed rate as per the recommendation. In addition, Majority (71.11 %) of the beneficiaries fully adopted the recommended spacing followed by partial adoption (28.89 %). The quantity of chemical fertilizer applied, 56.11 per cent of beneficiaries partially applied recommended phosphorous followed by nitrogen (51.17 %) and potash (51.11 %). In case of intercropping, majority (69.44 %) of the beneficiaries partially adopted the practice followed by full adoption (30.56 %). Over forty (40.55 %) per cent of the beneficiaries partially adopted the management practices for flower drop followed by no adoption (37.78 %) and full adoption. In addition Over two fifth (45.56 %) of the beneficiaries partially adopted the recommended management practices for sucking pests like leaf hopper, thrips and mirid bugs followed by full (32.33 %) and no adoption (22.22 %). Education, farming experience, land holding, extension contact, risk orientation and management orientation had positive and significant relationship with the adoption of recommended practices in Bt cotton crop.

Introduction

Globally, rainfed areas are hot-spots for poverty, malnutrition and degradation of natural resources. In our country, out of the total geographical area of 329 million ha, 143 million ha is under cultivation, out of which 108 million ha area is rainfed (75%). Rainfed

agriculture contributes about 44 per cent of the total food grain production in the country and supports 40 per cent of the population. Bulk of pulses, oil seeds, millets, coarse grains, commercial crops etc., are accounted by the rainfed agriculture. Thus, dryland holds great prospect of contributing substantially to country's food production. Unless the production from these rainfed areas increases, the real breakthrough in agriculture may not be possible. Hence, dry land development strategy is important for agriculture development in the state. Scanty rainfall on the one hand and high density of rainfall on the other are the major threats to the dry land agriculture.

Improved crop production technologies with the efficient utilization of natural resources play an important role in increasing the dry land crop productivity and inturn production. Karnataka stands second in possessing area under rainfed agriculture after Rajasthan in the country. Crop yields in dry land areas are quite low (1-1.5 t ha^{-1}) which are lower by two to five folds of the yield from researchers managed plots. In this context, the Government of Karnataka has taken up an innovative science-led development initiative called Bhoochetana to harness the potential of rainfed agriculture in the state with the help of International Crops Research Institute for Semi - Arid Tropics (ICRISAT) which was launched on 23 May 2009.

More or less similar situation exists in Karnataka. Out of total cultivated area of 123.85 lakh ha, about 70 per cent of the area is rainfed. Major rainfed crops of the state are jawar, ragi, maize, minor millets, groundnut, sunflower, soybean, pigeonpea, greengram, bengalgram and fieldbean *etc*. It has been observed that the average yields of these crops by and large in the state are less than the national average and also averages of other states. Further, a wide gap exists in actual yield levels in the farmer's field and yields of field level demonstrations. The main responsibility of extension work lies with the Department of Agriculture. The department is striving hard to bridge the gap between the actual farmers yield and the potential yields of crops, through various extension methods. In India, the State Department of Agriculture charged with the responsibility of agricultural development has grown into mammoth service organization.

The programme has completed five years. Now, it is necessary to study how the Bhoochetana programme has made an impact on knowledge level among cotton growers and relationship with their socio-engineering attributes along with management & situational attributes. In this context, the present study is being conducted to analyse the adoption status of farm beneficiaries about the improved production technologies of Bt cotton.

Materials and Methods

The study was conducted in Raichur, Koppal and Bellary districts of Hyderabad Karnataka during the year 2015-16 These district's were purposively selected because of maximum area under cotton is being cultivated in Hyderabad Karnataka region.

The Ex-post-facto research designs were used for the study. Two talukas from each districts selected and inturn, two villages under each talukas were selected based on the criteria of having highest area under Bt cotton.

Again thirty cotton growers identified from each village. Thus total size constitutes 180 respondents. The standard and structured schedule used for investigation, which is being tested in non-sample area. The systematic random sampling procedure used to finalize Bt cotton growers for the research.

Results and Discussion

Overall adoption of Bhoochetana Programme beneficiaries regarding cultivation practices of Bt cotton

The results presented in Table 1 indicated that 38.89 per cent of respondents belonged to medium adoption category, followed by 27.22 and 33.89 per cent of the respondents belonged to low and high adoption categories, respectively. The previous finding indicated that the 47.22 per cent of the respondents had medium knowledge level regarding Bt cotton cultivation practices. This would certainly influence the adoption of farmers. Percentage of respondents having medium level of knowledge (47.22 %) and adoption (38.89 %) 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 farmers in the present study were educated, with high income and big land holdings. These must have contributed for higher adoption of Bt cotton as 38.89 per cent of them had medium adoption level and 33.89 per cent had high adoption level, together contributing for more than 70 per cent. The findings of the study were in accordance with the findings of Bhagawat and Gohad (2003) and Raghavendra (2005).

Extent of adoption of Bhoochetan Programme beneficiaries regarding individual cultivation practices of Bt cotton

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 know this fact and made sincere efforts to obtain suitable hybrid to ensure better crop yield.

Exactly 80.00 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. Labour and water availability should coincide with implement the operation at right time. This could be the reason for that 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 seed sowing. Dibbling method of sowing ensures uniform and properly spaced plants. The findings were in line with the findings of Nagaraja (2002). Among the respondents, recommended seed rate was fully and partially adopted by 77.22 and 21.81 per cent of the farmers. Spacing was fully adopted by 71.11 per cent and. Spacing contribute to the plant population intern to the yield and also spacing is essential for intercultivation and to carry out other operations. Whereas, 28.89 per cent respondents partially adopted spacing, it was observed during the data collection in the study area, early sown farmers keep closer spacing than the recommended to get higher yield. More than half of the respondents 55.56 per cent were applied FYM in partial quantum as per recommendation and 44.44 per cent fully adopted chemical fertilizers which depends on the availability and fertility of the soil. Among the respondents, 51.17 and 48.33 per cent of respondents fully and partially adopted the application of nitrogen fertilizer. Whereas, 43.89 per cent of them fully adopted phosphorous application followed by partial adoption (56.11 %). This demands cash in hand to purchase which adds to cost of cultivation. Farmers with urge of getting

higher yield applied deviation from the recommendation. Less than one third (30.56%) of respondents fully adopted intercropping as it increases the crop stand and hence the yield. Further, they were in the notion of hindrance in the intercultivation and hand weeding operation. Three fourth (69.44%) of the farmers fully adopted the hand weeding practice and 38.39 per cent of them fully adopted recommended herbicide. Labour scarcity is the biggest problem in the agriculture and this might be the reason for above findings. Majority of farmers partial adopted the insect pest and disease management practices. In the study, majority of farmers (47.22%) belonged to medium knowledge category and Bt cotton is less prone insect pest might be the reason.

Relationship between adoptions about Bt cotton farm beneficiaries with their independent variables

It could be seen from the Table 3 that, education had positive and significant relationship with the adoption of recommended practices in Bt cotton crop. Education exposes farmers for more communication media or methods for more perception and comprehension which could be observed among better educated farmers than others. Acquisition of formal education may also help to interpret ideas in a rational manner, resulting in programmatic decision making. Thus, education provides persistent orientation to the farmers wherein they gradually learn about innovations and change on to better entrepreneur ultimately reflecting on better management of the enterprises.

Therefore, the present findings seemed to be logical and this finding is in agreement with the findings of Kanavi (2000) and Rathod (2005). Farming experience exhibited 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. Hence there is significant relationship between farming experience of the respondents and adoption level. This finding is close agreement with the finding of Shinde *et al.,* (2000). 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. Therefore, land holding must have positive relationship with the extent of adoption of recommended practices. Krishnamurthy (1999) and Thippeswamy (2007) observed positive and significant relationship between size of land holdings and the adoption.

Table.1 Overall adoption of Bhoochetana Programme beneficiaries regarding cultivation practices of Bt cotton

n=180

Sl. No.	Category	Frequency	Percentage
1	Low (mean - 0.425*SD)	49	27.22
2	Medium (mean ± 0.425*SD)	70	38.89
3	High (mean +0.425*SD)	61	33.89
	Mean	**31.89**	
	SD	**5.28**	

Table.2 Extent of adoption of Bhoochetan Programme beneficiaries regarding individual cultivation practices of Bt cotton

n=180

Sl. No.	Practices	Extent of adoption					
		FA		PA		NA	
		F	%	F	%	F	%
1	**Seed selected**						
	Mallika	150	83.33	0	0.00	0	0.00
	Dr.Brent	85	47.27	0	0.00	0	0.00
	Bunny	98	54.44	0	0.00	0	0.00
	Vikram-5	95	52.78	0	0.00	0	0.00
2	**Sowing time** (May to July 15)	144	80.00	36	20.00	0	0.00
3	**Sowing method**						
	Manual dibbling	180	100.00	0	0.00	0	0.00
4	**Seed rate** (2.5-3 kg/ha)	139	77.22	41	21.81	0	0.00
5	**Spacing** (90x60cm)	128	71.11	52	28.89	0	0.00
6	**FYM application**	80	44.44	100	55.56	3	1.67
7	**Chemical fertilizer** (kg/ha)					0	0.00
	N(120)	87	48.33	93	51.17	0	0.00
	P(60)	79	43.89	101	56.11	0	0.00
	K(60)	88	48.89	92	51.33	0	00.00
8	**Intercropping** (cotton and chilli:1:1)	55	30.56	125	69.44	0	00.00
9	**Weeding**						
	Hand weeding (2 time)	125	69.44	55	30.56	0	0
	Herbicide (Pendimethalin@1lit 1000 lit of water)	31	17.22	149	82.78	0	0.00
10	**Management of physiological disorder**						
	Leaf reddening (1% MgSO4)	50	27.78	84	46.67	46	38.33
	Flower drop (Planofix @ 0.25ml/l)	39	21.67	72	40.55	68	37.78
11	**Disease management**						
	Leafspot (Mancozeb @ 2g/l)	45	25.00	60	33.33	75	41.67
	Cotton rust (copper oxychloride @ 3g/l)	24	13.33	156	86.67	0	0.00
12	**Insect pest control**						
	Sucking pest (Thrips, Aphids, Whitefly) (Acitamipride @2.0 ml/lit Trizophos @1.5 ml/lit)	58	32.22	82	45.56	40	22.22
13	Micronutrient (1% MgSO4)	49	27.22	55	30.56	76	42.22
14	Green manure (sunhemp)	50	27.78	130	77.22	0	0.00
15	Bio-fertilizer (*Azospirillum*)	64	35.56	5	2.78	111	61.67

FA-Full Adoption, PA-Partial Adoption, NA-No adoption, F – Frequency % – Percentage

Table.3 Relationship between adoptions of Bt cotton farm beneficiaries with their Independent variables

n= 180

Sl. No.	Variables	Correlation coefficient (r)
1	Age	-0.025
2	Education	0.145*
3	Farming experiences	0.233**
4	Land holding	0.017
5	Annual income	0.128*
6	Material possession	0.229**
7	Livestock possession	-0.037
8	Cropping intensity	0.066
9	Extension participation	0.330**
10	Extension contact	0.307**
11	Social participation	0.038
12	Mass media participation	0.109
13	Cosmopoliteness	0.211**
14	Innovativeness	0.119
15	Risk orientation	0.282**
16	Achievement motivation	0.221**
17	Economic motivation	0.219**
18	Management orientation	0.112*

* = Significant at 0.05 % level; **= Significant at 0.01% level; NS = Non Significant

Annual income of the Bt cotton growers was found to have positive and significant relationship at 5 percent with their adoption level of recommended Bt cotton cultivation practices. Income of farmers has influenced the adoption of recommended practices; the farmers with low annual income were low adopters while those with high annual income were high adopters. This might be possible reason for better adoption of recommended practices by Bt cotton growers of high economic status. Similar findings have been reported in the past Raghavendra (1997) and Reshmy (1998). Material possession was positively and significantly correlated with level of adoption of recommended cultivation practices by the Bt cotton growers. Extension participation showed positive and significant relationship with the adoption of recommended cultivation practices of Bt cotton crop by the respondents. The possible reason for this trend may be that, the farmers who had participated in training course, attended meeting, field days, tours, krishimela

might have come in closer contact with extension personnel and other farmers leading to increased knowledge about cultivation practices, which might have motivated them for positive action that is adoption. The other reason could be that extension the participation provides opportunity for farmers to exchange their ideas based on their experience thus leading to higher adoption. The findings of the present study were in conformity with the findings reported by Kharatmol (2006). The Extension contact was found to have positive and significant relationship with the adoption level of recommended practices. Through regular contact with the extension personnel of developmental departments, NGOs and other organizations farmers come closer with change agents and try to confirm the results of new technology in their fields.

This might have contributed to some extent for such significant relationship between the extension contact and the adoption level of cotton growers. The findings of the present study were in conformity with the findings reported by Nirmala Devi and Manoharan (1999). The Cosmopoliteness of Bt cotton growers was found to have positive and significant relationship with their adoption level of recommended practices.

It was evident that, the variable risk orientation was found to have positive and significant relationship with the adoption of recommended practices. This implies that farmers who had favourable orientation towards taking risk 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. Hence risk orientation of farmers has significant effect on their adoption level of recommended practices. The findings were in line with the findings of Meti (1998) and Rathod (2005).

It could be observed form the results that, achievement motivation was positively and significantly correlated with the adoption of recommended practices in cotton at 5% level of significance. The excellence or perfection in what one does is determining the achievement motivation and to achieve destination one need to take adequate and meticulously care to achieve success maximising and sustaining yield and income. Hence, achievement motivation was found to be significantly correlated with the adoption of recommended practices. The results are in line with the findings of Chandregowda (1996) and Resmy (1998). The economic motivation showed positive and significant relationship with the adoption of level of recommended practices. It was evident that, the variable management orientation was found to have positive and significant relationship with the adoption of recommended practices.

Increase in adoption status among the beneficiaries is being observed due to exposure in various capacities building programme conducted under Bhoochetana programme. It was concluded that improvement in the adoption status of beneficiaries on production technologies like suitability of Bt cotton genotype, spacing, water management, pest & disease management is noticed. Hence this improvement of adoption status is being influenced by various independent variables of beneficiaries. As result, increase in marginal return by reducing cost of cultivation, which is due to timely adoption of suitable technologies enchased for higher marginal return in Bt cotton enterprise.

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