International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(6): 524-527

Received: 05-09-2019
Accepted: 10-10-2019

Kantheti Vysali
Ph.D. Scholar, Department of Agricultural Extension, Agricultural College, OUAT, Bhubaneswar, Odisha, India

P Rambabu
Director of Extension, Administrative office, ANGRAU, Lam, Guntur, Andhra Pradesh, India

B Mukunda Rao
Professor, Polytechnics, O/o Dean of Agriculture, ANGRAU, Administrative office, Lam, Guntur, Andhra Pradesh, India

V Radha Krishna Murthy
Professor, Department of Agronomy, Agricultural College, Bapatla, Andhra Pradesh, India

Corresponding Author:
Kantheti Vysali
Ph.D. Scholar, Department of Agricultural Extension, Agricultural College, OUAT, Bhubaneswar, Odisha, India

Adoption of *Bt* cotton tenant farmers on recommended package of practices in Guntur district of Andhra Pradesh

Kantheti Vysali, P Rambabu, B Mukunda Rao and V Radha Krishna Murthy

Abstract
The study was conducted in Guntur district of Andhra Pradesh state during 2017-18. A total of 120 *Bt* cotton tenant farmers were selected randomly for the study. Data was collected with interview schedule. Data revealed that a little more than half of the *Bt* cotton tenant farmers (52.50%) had medium adoption, followed by high (24.17) and low (23.33%) adoption levels with regard to adoption of *Bt* cotton production technology. The practices like the use of *Bt* cotton hybrid seeds, recommended spacing, seed rate, spraying of 2.00 per cent urea was adopted fully by majority of the *Bt* cotton tenant farmers because they are easy to adopt and are available easily at the local markets. The practices like crop rotation, application of zinc, phosphorus, potassium, nitrogen, magnesium, boron use were adopted partially by majority of the *Bt* cotton tenant farmers because the recommended dosages are difficult to understand and adopt. But, they were compulsory technologies to be followed. Lack of awareness, lack of extension contact might also be the reason for their partial adoption. There was a cent per cent non adoption of refuge crop, Bio-fertilizers, Stem application, intercropping and topping of branches.

Keywords: Adoption, *Bt* cotton tenant farmers

Introduction
Tenant farmers are those who cultivate crops by taking land on lease. Tenant farming is an agricultural production system in which land owners contribute their land and often takes care of operating capital and management; while tenant farmers contribute their labour along with at times varying amounts of capital and management. In Andhra Pradesh cotton was cultivated in an area of 4.49 lakh hectares with a production of 13.10 lakh bales and productivity of 791 Kg/ha in 2016-17 (Anonymous 2016) [1].

The use of *Bt* cotton is a positive environmental protection because it makes possible the reduction of the insecticides load on the environment and reduced usage of such chemicals by farmers. *Bt* cotton is genetically engineered cotton, which contains a gene taken from a soil bacterium (*Bacillus thuringiensis*) to produce toxins in the plants.

To achieve the higher level of production and productivity the inadequate level of adoption of the recommended technology may be a big hindrance which also hampers the production potential of the cotton crops. So there is a need to help tenant farmers to realise the importance of production recommendations to achieve the objective of overcoming the gap between the potential yield and actual yield. With this background, the present study has been made to know the adoption level on recommended package of practices of tenant farmers in *Bt* cotton.

Material and Methods
The investigation was carried out during the year 2017 in Guntur district of Andhra Pradesh by using ex-post facto research design to achieve the objectives of the study as the variables already occurred. According to Kerlinger (1983) [2], the ex-post-facto research design is a systematical empirical enquiry in which the scientist does not have any direct control of independent variables and was not manipulable.

The state of Andhra Pradesh was selected to get well acquainted with the regional language which would help to build a good rapport and also facilitates in depth study through personal observation.

Guntur district was selected as it has the highest area under cotton cultivation. Out of 57 mandals in Guntur district, three mandals were selected randomly after listing out the total number of mandals where tenant farmers were more in the cotton growing area. Three mandals, namely Prathipadu, Veldurthi, Karempudi were selected. After listing out the number of villages in each selected mandals, four villages were selected from each selected mandal randomly where tenant farmers were more with the cotton growing area. Ten *Bt* cotton tenant farmers were selected from each village by simple random sampling procedure Thus, making a total of 120 farmers.

The data from the respondent farmers were collected with the help of schedules and interviews. The data collected was analysed and suitable interpretations were drawn. The statistical techniques like mean, standard deviation, frequency, percentage were used to analyse the data. Accordingly the respondents were classified into various groups.

A sample of 120 *Bt* cotton tenant farmers selected from 12 selected villages. The data was collected through well structured interview schedule, which was coded, tabulated and analysed in spss and presented in tables to make findings meaningful and easily understandable.

Results and Discussion

Table 1: Distribution of *Bt* cotton tenant farmers according to their adoption level on recommended package of practices (n=120)

S. No.	Category	*Bt* cotton tenant farmers	
		Frequency	Percentage
1	Low (<42.41)	28	23.33
2	Medium (42.41-63.19)	63	52.50
3	High (>63.19)	29	24.17
	Total	120	100.00
Mean=52.80 SD=10.39			

An overview of table 1 makes it clear that a little more than half of the *Bt* cotton tenant farmers (52.50%) had medium adoption, followed by high (24.17) and low (23.33%) adoption levels with regard to adoption of *Bt* cotton production technology.

The possible reason for the medium level of adoption is medium knowledge, extension contact, innovativeness, mass media exposure, economic motivation, risk orientation, market orientation on *Bt* cotton production technology. The reasons for the low adoption level of one-fourth of the *Bt* cotton tenant farmers is due to low contact with extension personnel, low innovativeness.

Hence, the department of agriculture should organize training programmes about *Bt* cotton cultivation practices to impart knowledge and skill which will enhance adoption levels. As the tenant farmers are resource poor (not having own fixed cultivable land), Provision of credit and subsidy facilities by the government to the tenant farmers increases the adoption level of recommended *Bt* cotton cultivation practices. Enhancement of the minimum support price will also result in an increased adoption level of *Bt* cotton tenant farmers regarding recommended production technology.

This finding was in agreement with the findings of Sakthi (2008) [4] Kiranmayi (2013) [3].

Table 2: Content analysis of adoption level on production technology of *Bt* cotton tenant farmers (n=120)

S. No.	Practices*	Extent of adoption					
		Full adoption		Partial adoption		Non adoption	
		F	%	F	%	F	%
1	Maintenance of recommended spacing of 36-48 inches between row to row and 8-24 inches between Plant to plant.	86	71.67	34	28.33	0	0.00
2	Using recommended amounts of seed rate (750g-1kg/ac).	74	61.67	46	38.33	0	0.00
3	Use of recommended *Bt* cotton hybrids.	120	100.00	0	0.00	0	0.00
4	Maintenance of refuge crop with non-*Bt* cotton.	0	0.00	0	0.00	120	100.00
5	Usage of bio-fertilizers like Azotobacter, Azospirillum, Pseudomonas.	0	0.00	0	0.00	120	100.00
6	Application of farm yard manure @ 5 t/ac.	29	24.17	29	24.17	62	51.66
7	Spraying of 2% urea / 2% DAP / 2% Potassium nitrate for reducing flower drop, leaf drop at high moisture levels.	54	45.00	34	28.33	32	26.67
8	Application of phosphatic fertilizer as basal dose.	30	25.00	25	20.83	65	54.17
9	Application of nitrogen and potassium at 20, 40, 60, 80 days after sowing.	40	33.33	80	6667	0	0.00
10	Application of recommended quantities of nitrogen (60 Kg N/ac).	52	43.33	68	56.67	0	0.00
11	Application of recommended quantities of phosphorus (24 Kg P/ac).	44	36.67	76	63.33	0	0.00
12	Application of recommended quantities of potassium (24 kg K/ac).	45	37.50	75	62.50	0	0.00
13	Application of magnesium (10 g $MgSO_4$/1 litre water)	20	16.67	67	55.83	33	27.50
14	Application of zinc ($ZnSO_4$ 20 Kg/ac).	19	15.83	85	70.84	16	13.33
15	Application of boron (1-1.5 g borax in one litre water).	25	20.83	65	54.17	30	25.00
16	Use of yellow sticky traps for the management of whitefly.	9	7.50	4	3.33	107	89.17
17	Use of blue sticky traps for the management of Thrips.	0	0.00	5	4.17	115	95.83
18	Use of neem products for control of borers and sucking pests.	43	35.83	20	16.67	57	47.50
19	Stem application of monocrotophos or imidacloprid for control of sucking pests.	0	0.00	0	0.00	120	100.00
20	Irrigation at critical stages.	0	0.00	48	40.00	72	60.00
21	Application of recommended pesticides for control of pests.	49	40.83	71	59.17	0	0.00
22	Adoption of crop rotation.	24	20.00	92	76.67	4	3.33
23	Adoption of intercropping.	0	0.00	0	0.00	120	100.00
24	Use of recommended herbicides.	31	25.83	24	20.00	65	54.17

25	Spraying of Naphtalic acetic acid @ 10 ppm (Planophix 0.25 ml/ 1 litre water) for reducing flower drop.	42	35.00	39	32.50	39	32.50
26	Use of 4-8 pheromone traps per acre.	12	10.00	7	5.83	101	84.17
27	Adoption of Zero Budget Natural Farming (ZBNF).	0	0.00	0	0.00	120	100.00
28	Topping of the terminal buds at 16-18 Sympodial branching stage so as to reduce egg masses of *Helicoverpa* at 80-100 days.	0	0.00	0	0.00	120	100.00
29	Adoption of soil test based recommendations.	14	11.67	18	15.00	88	73.33
30	Adoption of brown manuring.	0	0.00	0	0.00	120	100.00

* Multiple response format F=Frequency % =Percentage

Results furnished in the table 2 revealed that, the *Bt* cotton tenant farmers fully adopted the following production technologies in decreasing order are use of recommended *Bt* cotton hybrid seeds (100%), maintenance of recommended spacing (71.67%), using recommended amounts of seed rate (61.67%), spraying of 2% urea / 2% DAP / 2% potassium nitrate for reducing flower drop, leaf drop at high moisture levels (45.00%), application of recommended quantities of nitrogen (43.33%), application of recommended pesticides for control of pests (40.83%), application of recommended quantities of potassium (37.50%), application of recommended quantities of phosphorus (36.67%), use of Neem products for control of borers and sucking pests (35.83%), spraying of naphtalic acetic acid for reducing flower drop (35.00%), application of nitrogen and potassium at 20, 40, 60, 80 days after sowing (33.33%), use of recommended herbicides (25.83%), application of phosphatic fertilizer as basal dose (25.00%), application of farm yard manure (24.17%), Application of boron (20.83%), adoption of crop rotation (20.00%), application of magnesium (16.67%), application of zinc (15.83%), adoption of soil test based recommendations (11.67%), use of Pheromone traps (10.00%), use of Yellow sticky traps for the management of white fly (7.50%).

The practices like the use of *Bt* cotton hybrid seeds, recommended spacing, seed rate, spraying of 2.00 per cent urea was adopted fully by majority of the *Bt* cotton tenant farmers because they are easy to adopt and are available easily at the local markets. The mostly used *Bt* cotton hybrid seed in the study area are Rasi 569 and Ashirwad.

It also revealed that the *Bt* cotton tenant farmers partially adopted the following production technologies in decreasing order are adoption of crop rotation (76.67%), application of zinc (70.84%), application of nitrogen and potassium at 20, 40, 60, 80 days after sowing (66.67%), application of recommended quantities of phosphorus (63.33%), application of recommended pesticides for control of pests (59.17%), application of recommended quantities of potassium (62.50%), application of recommended quantities of nitrogen (56.67%), application of magnesium (55.83%), application of boron (54.17%), irrigation at critical stages (40.00%), use of recommended amounts of seed rate (38.33%), spraying of naphtalic acetic acid for reducing flower drop (32.50%), spraying of 2% urea / 2% dap / 2% potassium nitrate for reducing flower drop, leaf drop at high moisture levels (28.33%), maintenance of recommended spacing (28.33%), application of farm yard manure (24.17%), application of phosphatic fertilizer as basal dose (20.83%), use of recommended herbicides (20.00%), use of Neem products for control of borers and sucking pests (16.67%), adoption of soil test based recommendations (15.00%), use of pheromone traps (5.83%), use of blue sticky traps for the management of Thrips (4.17%), usage of yellow sticky traps for the management of white fly (3.33%).

The practices like crop rotation, application of zinc, phosphorus, potassium, nitrogen, magnesium, boron use were adopted partially by majority of the *Bt* cotton tenant farmers because the recommended dosages are difficult to understand and adopt. But, they were compulsory technologies to be followed. Lack of awareness, lack of extension contact might also be the reason for their partial adoption.

Results furnished in the table 2 revealed that, the *Bt* cotton tenant farmers non-adopted the following production technologies in decreasing order are maintenance of refuge crop with non-*Bt* cotton (100.00%), use of bio-fertilizers (100.00%), stem application of monocrotophos or imidacloprid for control of sucking pests (100.00%), adoption of intercropping (100.00%), adoption of Zero Budget Natural Farming (ZBNF) (100.00%), topping of the terminal buds at 16-18 sympodial branch stage (100.00%), brown manuring (100.00%), use of blue sticky traps for the management of Thrips (95.83%), use of yellow sticky traps for the management of white fly (89.17%), use of pheromone traps (84.17%), adoption of soil test based recommendations (73.33%), irrigation at critical stages (60.00%), application of phosphatic fertilizer as basal dose (54.17%), use of recommended herbicides (54.17%), application of farm yard manure (51.66%), use of neem products for control of borers and sucking pests (47.50%), spraying of naphtalic acetic acid for reducing flower drop (32.50%), application of magnesium (27.50%), spraying of 2% urea / 2% DAP / 2% potassium Nitrate for reducing flower drop, leaf drop at high moisture levels (26.67%), application of boron (25.00%), application of zinc (13.33%), adoption of crop rotation (3.33%).

Reasons for the cent per cent non adoption of refuge crop is farmers felt maintenance of refuge crop needs extra spraying of insecticides for the control of bollworms on refuge crop and due it yields decreases since, it occupies 5 rows around the *Bt* cotton crop. Bio-fertilizers were non-adopted by cent per cent *Bt* cotton farmers because of lack of proper training about the usage of bio-fertilizers, lack of subsidy, non-availability at local markets and lack of immediate results. Stem application was cent per cent non adopted by *Bt* cotton farmers because they felt that it is a very risky process of applying chemical to each and every stem and also it needs high labour cost. There is cent per cent non-adoption of intercropping, the possible reason for this is the maintenance of intercropping with pulses increases the occurrence of pests, diseases for which separate sprayings are required, which in turn leads to high cost of cultivation and lack of remunerative price to the pluses and topping of branches is also cent per cent non-adopted because of high labour costs.

The practices that are adopted beyond the recommended dose among partially adopted *Bt* cotton tenant farmers are application of fertilizers, pesticides. 55.00 per cent of the *Bt* cotton tenant farmers had adopted beyond the recommended dose of fertilizers. 50.00 per cent of the *Bt* cotton tenant farmers had adopted beyond the recommended dose of pesticides. The excessive use of inorganic fertilizers causes serious environmental degradation. Tenant farmers increased the frequency of fertilizer applications to enhance yields. These practices are still used and have caused significant

environmental degradation. This leads to higher levels of residual fertilizers in the soil, which potentially contribute to groundwater, atmospheric pollution as a result of leaching and high cost of cultivation. Over-fertilization also may adversely affect productivity and crop quality.

Hence, the tenant farmers need to be educated on balanced fertilizer, pesticide application, through trainings and demonstrations. Dependence on input dealers for the guidance regarding the fertilizer and pesticide applications made it a farmer to apply over dosages. Thus, the government should take the steps to provide proper technical guidance at the right time through extension agencies. Hence, Department of Agriculture, ANGRAU and the government should make efforts to increase the adoption level of *Bt* cotton tenant farmers by providing the subsidy, loans at low interest rates, increasing awareness among the farming community about various useful practices, providing trainings and demonstrations.

Conclusion

The analysis on adoption of Bt cotton tenant farmers indicated that little more than half of the *Bt* cotton tenant farmers had medium adoption, followed by high and low adoption levels with regard to adoption of *Bt* cotton production technology. The practices that are adopted beyond the recommended dose among partially adopted *Bt* cotton tenant farmers are application of fertilizers, pesticides. There was a cent per cent non adoption of refuge crop, Bio-fertilizers, Stem application, intercropping and topping of branches.

References

1. Anonymous. All India Co-ordinated Research Project on Cotton Annual Report, 2016. http://www.aiccip.cicr.org.in/CD_16_17/3_PC_Report.pdf.
2. Kerlinger FN. Foundations of Behavioural Research. Surjeet Publications, Delhi, 1983, pp. 556.
3. Kiranmayi K. Adoption behaviour of chilli farmers in Guntur district of Andhra Pradesh. M. Sc. (Ag.) Thesis. Acharya N.G. Ranga Agricultural University, Guntur, India, 2013.
4. Sakthi B. Knowledge and adoption of *Bt* cotton growers in Peramballur district. M. Sc. (Ag.) Thesis. Tamil Nadu Aricultural University, Coimbatore, India, 2008.