Original Research Article

An Analysis of farmers extent of Adoption and Knowledge of Bt. Cotton in the Jangaon District of Telangana, India

Abstract –The study was conducted in Jangaon district of Telangana during the year 2022. The main purpose of this study is to measure the Extent of Adoption and knowledge of Bt cotton in Jangaon District of Telangana. A total 120 respondents were selected purposively from six villages under Lingala ghanpur block because most of the respondents were cotton growers. Descriptive research design was adopted for the study and data was collected by personal interview method by using pre structured interview schedule. This study revealed that the respondents (49.17%) had medium level of adoption followed by low (31.66%) and high (19.16%) levels of adoption among the respondents and also the most of the respondents (38.33%) had high level of knowledge on Bt. Cotton Adoption followed by medium (35%) and low (26.66%) levels of knowledge.

Keywords – Adoption, Knowledge, Bt. Cotton, Descriptive research.

INTRODUCTION

Cotton is one of the most important fiber and cash crop of India and plays a dominant role in the industrial and agricultural economy of the country. Cotton is the most important fiber crop not only of India but of the entire world. It provides the basic raw material (cotton fiber) to cotton textile industry, Cotton in India provides direct livelihood to 6 million farmers and about 40-50 million people are employed in cotton trade and its processing. India has the largest area under cotton cultivation in the world though it is the world's third largest producer of cotton after China and the USA. Currently it is grown over 6 per cent of the net sown area.

In Telangana, cotton scenario before introduction of Bt. cotton was not a bright picture. The crisis in cotton revolves around the main issues like raising cost of cultivation, hiked use of pesticides, consequent endemic pest and diseases and market fluctuations which have hit the producers so severely that most of them end up deep in debt. Epidemics of whitefly and boll worms, besides frequent and severe droughts had forced several farmers to commit suicide. Under these circumstances, Bt. cotton has emerged as an attractive option before the cotton farmers (**Singh and Kaushik, 2007**).

In India, it is important cash and commercial crop valued for its fiber and vegetable oil. It is a source for earning the valuable foreign exchange by providing employment to millions of people and hence plays a significant role in the national economy. The diverse products obtained from cotton include textile raw material, cotton seed is a major source of vegetable oil and cotton cake as a rich source of high quality protein for livestock feed. Cotton is

primarily grown as a fiber crop. It is harvested as 'seed cotton, which is then 'ginned to separate the seed and lint. The long lint fibers are further processed by spinning to produce yarn that is knitted or woven into fabrics. **(Kalidasan 2020).**

Bt. cotton, the first genetically modified (GM) crop in India, was initially approved in India on March 26th 2002 for commercial cultivation in six states belonging to southern and central cotton cultivation zones of the country. The commercial cultivation of Bt. cotton in the world first began in 1996. The reason for the introduction of Bt. cotton was to counter attack the three types of bollworms,*viz.* American bollworm (*Helicoverpa armigera*), pink bollworm (*Pectinophora gossypiella*) and spotted bollworms (*Earias vitella*) which used to cause substantial damage to the crop, resulting in low productivity. Therefore, Mahyco (Maharashtra Hybrid Seed Company), in collaboration with Monsanto, introduced Bt. cotton technology into India. Bt. cotton carries the Cry1Acgene derived from the common soil bacterium Bacillus thuringiensis var. kurstaki, which results in the expression of the Cry1Ac protein that confers resistance to the bollworm complex (**Barwal *et. al.*2004**).

Literature review

Kranthi and Stone (2020) reported that Genetically modified Bacillus thuringiensis (Bt) cotton in Indiahas focused on short-term impacts and has also ignored other major changes in India's cotton agriculture. This Perspective combines several data sources over a 20- year span to provide long-term comparisons of Bt adoption with yields and other inputs at both countrywide and state-specific scales.

Rajput and Chinchmalatpure (2016) conducted a study in Jalgaon and Dhule district of North Maharashtra, with a random sample of 175 Bt cotton growers, to measure the level of knowledge of Bt cotton growers and to understand the relationship between selected characteristics of Bt cotton growers and their extent of adoption.

Sharma et al (2021) reported Adoption level, factors affecting adoption and cropping pattern of growing Bt. Cotton. Most of the respondents were belonging to 35–50 years of age group and were educated up to secondary level. Majority of the respondents (71.67 percent) were having mediumadoption level. There was also significant association between socio-economic variables like size of land holding, annual income, mass media exposure of the family with adoption levelof Bt. cotton farmers.

Tian et al. (2015) revealed that Crops producing insecticidal crystal (Cry) proteins from Bacillus thuringiensis (Bt) control important lepidopteran pests. However, pests such asaphids not susceptible to Cry proteins may require other integrated pest management (IPM) tactics, including biological control.

Xiao et al. (2021) showed that Bacillus thuringiensis (Bt) crops have been widely planted and the effects of Bt- crops on populations of the target and non-target insect pests have been well studied. However, the effects of Bt-crops exposure onmicroorganisms that interact with crop pests have not previously been quantified.

Research methodology –

Descriptive research design was adopted for the study as it describes the characteristics or phenomena that are being studied. The present study was conducted in Jangaon district Telangana. Out of 6 blocks in Jangaon district, Lingala ghanpur block is selected purposively based on maximum area covered under cotton cultivation. From the selected block, six villages were selected purposively based on the maximum area covered under Bt cotton cultivation. A total number of 120 respondents were selected randomly from the ten villages of the selected block. The information was elicited from the respondents with the help of structured interview schedule, pen, pencil; camera was also use during the data collection. The Primary data was collected with the help of face to face interview technique with the help of interview schedule with especially objectives, focused study. Secondary data was collected from library, journals, books, papers, and other materials related to study. The entire data were transformed into score for tabulation. To interpret the results and to show the relationship between independent variable and dependent variables, Mean, Frequency, Percentage, Co –efficient correlation was followed.

Rogers defined adoption as use or non-use of a new technology by a farmer at a given period of time. This definition can be extended to all economic units in the social system. To

measure the adoption behavior, an index was developed regarding improved production technology of cotton crop. Responses were recorded on 3 points of continuum as fully adopted, partially adopted and not adopted and scores assigned to each question were 3, 2 and 1 respectively. On the basis of range of scores, the respondents were categorized as low, medium and high groups.

Objectives of the Study-

1.To ascertain the extent of Adoption of Bt. cotton cultivation practices.

2.To ascertain the knowledge level of the respondents towards Bt. cotton cultivation.

RESULTS AND DISSCUSSION

1. Adoption of Bt. Cotton by the farmers –

Table no. 1 distribution of respondents according to their adoption level on Bt. Cotton cultivation.

S.No	Adoption of Bt. Cotton cultivation practices	FA (FULLY ADOPTED)		PA (PARTIALLY ADOPTED)		NA (NOT ADOPTION)	
		F	%	*f*	P%	*f*	%
1.	Summer ploughing	25	20.83	71	59.16	24	20.83
2.	FYM	-	-	81	67.5	39	32.5
3.	Recommended spacing	-	-	64	53.33	56	46.66
4.	Recommended seedrate	83	69.16	37	30.83	-	-
5.	Recommended dose of N.P.K	12	10	91	75.83	17	14.16
6.	Inter cultivation	14	11.66	92	76.66	14	11.66
7.	Pre emergence herbicides	30	25	71	59.16	19	15.83
8.	Inter cropping	22	18.33	82	68.33	16	13.33
9.	Hand weeding	-		101	84.16	19	15.83

10.	Post emergence herbicide	-		-		120	100
11.	Mechanical weeding	36	30	65	54.16	19	15.83
12.	N&K should applied in three equal Splits	73	60.83	42	35	5	4.16
13.	Earthing up	-	-	56	48.33	62	51.66
14 .	Plant protection measures	31	25.83	65	54.16	24	20
15.	IPM	40	33.33	66	55	14	11.66
16	Trap crops	32	26	54	45	34	28.33
17	Stem applications	37	30.83	63	52.5	20	16.66
18	Monitoring pests by using sticky traps,pheromones and light traps	-	-	62	23.33	58	76.66

From the above table 1 it can be observed that among the(69.16%) of the respondents are completely Adopted the recommended seed rate, (60.83%) of the respondents are Adopted the fertilizers N & K should applied in three equal splits, (33.33%)of the respondents are Adopted IPM practices, (30.83%) of the respondents are Adopted stem applications, (26%) of the respondents are Adopted trap crops, (84.16%) of the respondents are partially Adopted hand weeding, (76.66%) of the respondents are partially Adopted inter cultivation method, (75.83%) of the respondents are partially Adopted recommended dose of N.P.K, (68.33%) of the respondents are partially Adopted inter cropping, (67.5%) of the respondents are partially Adopted FYM, (76.66%) of the respondents are not Adopted Monitoring pests by using sticky traps, pheromones and light traps, (51.66%) of the respondents are not Adopted earthing up, (46.66%) of the respondents are not Adopted recommended spacing , (32.5%) of the respondents are not Adopted FYM, (28.33%) of the respondents are not Adopted trap crops.

S.No	Adoption	Frequency	Percentage
1.	Low(1-7)	38	31.66
2.	Medium(7-14)	59	49.17
3.	High(above14)	23	19.17
	Total	120	100.00

Fig 1 distribution of respondents according to their overall adoption of Bt. Cotton Cultivation.

Table 3.To see the relationship between Independent variables and Adoption of the respondents

S.No	Independent Variable	Correlation coefficient(r)
1.	Age	0.894*
2.	Education	0.841*
3.	Family size	0.998*
4.	Annual income	0.051NS
5.	Occupation	-0.282*
6.	Land holding	0.893*
7.	Farming Experience	0.815*
8.	Mass media exposure	0.580*
9.	Extension contact	0.300*
10.	Risk bearing capacity	0.943*

***** - Significant at 0.00 level of probability **NS** - Non-significant

2. Knowledge of farmers on Bt. Cotton cultivation .

Table 3 distribution of respondents according to their knowledge level on Bt. Cotton cultivation

S.No	Particulars	A AGREED		UD (UNDECIDED)		DA DISAGREED	
		f	%	*f*	%	*f*	%
1.	Ploughing	18	15	42	35	60	50
2.	Time of sowing	76	63.33	32	26.66	12	10
3.	Weed control methods	34	28.33	31	25.83	55	45.83

4.	Pre–emergence herbicides	35	23.33	61	50.83	24	20
5.	Pests and diseases of Bt cotton	26	21.66	59	49.16	35	29.16
6.	Harvesting stage	89	74.16	13	10.83	18	15
7.	Yield	42	35	53	44.16	25	20.83
8.	Marketing	48	40	45	37.5	27	22.5

From the above table 3 it can be observed that among the(74.16%) of the respondents are completely agreed that harvesting stage on time, (63.33%) of the respondents are agreed that on time sowing of crop,(40%) of the respondents are agreed that on time marketing ,(35%) of the respondents are agreed that getting expected yield,(28.33%) of the respondents are agreed that they are effective controlling weeds,(50.83%) of the respondents are undecided that they are unaware to spray pre emergence herbicides, ,(49.16 %) of the respondents are undecided that they are unable to identity pest and diseases,(44.16%) of the respondents are undecided that they are ,(37.5%) of the respondents are undecided that they having best marketing facilities, ,(35%) of the respondents are undecided regarding ploughing, ,(45.83%) of the respondents are disagree to weed control,(29.16%) of the respondents are disagree regarding pest and disease of Bt cotton, ,(20.83%) of the respondents are disagree regarding cotton yield.

TABLE 4 Distribution of respondents based on overall knowledge of Bt.cotton (n=120).

S.No	Knowledge	Frequency	Percentage
1.	Low(6-11)	32	26.66
2.	Medium(12-16)	42	35.00
3.	High(above16)	46	38.33

	Total	120	100.00

An examination of Table 4 and Fig 2 indicate that the most of the respondents (38.33%) had high level of knowledge on Bt. Cotton Adoption followed by medium (35%) and low (26.66%) levels of knowledge. **Jeewan *et al*.(2020)**

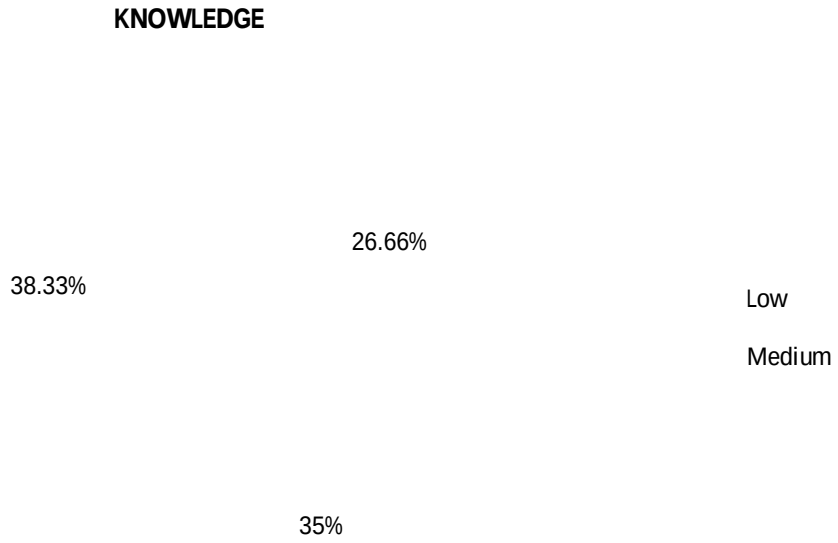

FIG 2 Distribution of respondents based on overall knowledge of Bt.cotton cultivation

Table: 5. Relationship between independent variables and knowledge of respondents

S.No	Independent Variable	Correlation coefficient(r)
1.	Age	-0.603*
2.	Education	0.376*
3.	Family size	-0.133*
4.	Annual income	0.978*
5.	Occupation	-0.891*
6.	Land holding	0.277*

7.	Farming Experience	0.419*
8.	Mass media exposure	0.693*
9.	Extension contact	0.882*
10.	Risk bearing capacity	0.153*

: Significant at 0.05 level of probability

NS**:** Non- Significant

CONCLUSION

It isconcluded that most of the respondents had medium level of knowledge and adoption towards improved cultivation practices of cotton. And also concluded that medium level of knowledge and adoption of farmers towards improved cultivation practices of cotton. Most of the respondents are having medium level knowledge on time of sowing of crop, harvesting stage and adopting new cultivation practices, recommended seed rate and also fertilizer application rate and partially adopted FYM and not adopting the Integrated Pest Management practices.The respondents expressed their problems such as high cost and non – availability of required hybrid seeds at right time, high cost and non – availability of chemical fertilizers in time, More sucking pest attack, etc., and their suggestions are to provide more practical exposure. Hence the government. should provide good provision of improved seed in time with minimum cost, training on identification of pests and diseases and their control.

Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

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