



# Growers Knowledge and Adoption of Chemical Fertilizer in Bt. Cotton

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## ABSTRACT

Increasing use of fertilizer has led to a phenomenal growth in the food grain production over the last four decades. However, the pattern of fertilizer use varies widely from state to state. Cotton is the major fibre crop of India and occupied an area of 8.5 m ha and accounted for 6.0 per cent of total fertilizer consumption. The study investigated Bt. cotton growers' knowledge towards the use of chemical fertilizers. Simple random sampling was used to select 180 cotton growers from 3 blocks of Rajkot district of Gujarat state. Data were collected with the aid of structured questionnaire through interview schedule and were analysed statistically. The results showed that the respondents perceived their general knowledge level on fertilizers use low; in the following order: method of application of chemical fertilizer (MS=1.98), time of application of different chemical fertilizer (MS=1.94), recommended dose of chemical fertilizer in Bt. cotton (MS=1.86), different type of chemical fertilizer (MS=1.85). The overall mean of knowledge domain was 1.82, indicated that the knowledge level of the farmers was low about use of chemical fertilizer in Bt. cotton. Over all adoption was 58.88 per cent of chemical fertilizer used in Bt. cotton, which is higher than knowledge level of the growers.

**Key Words:** Adoption, Bt. cotton, Constraints, Chemical fertilizer, Knowledge.

## INTRODUCTION

Gujarat is the single largest cotton producer state with 36 per cent (101 lakh bales) of the total national production from the area about 25.0 lakh hectares. Saurashtra account 65 per cent area of the state and contributes 68 per cent in the total production of the state. Average lint production of the Saurashtra is 754 kg/ha as against 615 kg/ha of the state. Among the different districts of Gujarat, Surendranagar ranks first in total cotton production of the state (22 %), followed by Rajkot (16.6 %). Cotton is the major fibre crop of India. The nutrient requirement for production of one quintal of Bt. cotton was found to be 5.84, 2.02 and 3.51 kg of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O, respectively. The percent contribution soil and fertilizer nutrients were found to be 45.87 and 37.77 for N, 83.63 and 31.90 for P<sub>2</sub>O<sub>5</sub> and 17.68 and 27.99 for K<sub>2</sub>O, respectively (Deshmukh *et al*, 2017). Cotton response to fertilizer is more critical than other crops. However, the haphazard fertilization

results in increasing the amount of nutrients not needed by the plant and increases the fertilizer costs of the farmer unnecessarily. Furthermore, incorrect fertilization leads to economic losses due to productivity falls besides environmental hazard (Bisson *et al*, 1994). For instance, excessive usage of nitrogenous fertilizer leads to yield remaining behind schedule (Steenkamp and Jansen, 1998), lowers the resistance of the plant against diseases caused by fungus and greater attractiveness to insect pests (Constable and Rochester, 1988)

Fertilizer is one of the major contributors to increased crop production. Recently, concern has been expressed that over-reliance on mineral fertilizers may cause unsustainable environmental penalties like eutrophication of surface water, nitrate (NO<sub>3</sub>) pollution of groundwater, heavy metal pollution of soil, atmospheric pollution due to emission of nitrous oxide and ammonia, acid rain, etc. Though there are incidences of these problems

in several parts of the world, very few of such problems in India can be linked to fertilizer use. Thus, it is necessary to know the knowledge and adoption of cotton growers about the use of chemical fertilizer. The study was undertaken to study the personal and socio-economic characteristics of the farmers, determine farmers' level of knowledge of chemical fertilizer use, adoption rate of chemical fertilizer and ascertain the constraints associated with the adoption of fertilizers by farmers.

## MATERIALS AND METHODS

The study was conducted in Krishi Vigyan Kendra, Junagadh Agricultural University, Pipalia (Rajkot-2) operational area of Saurashtra region. Out of seven operational taluka, three taluka were purposively selected *viz.* Dhoraji, Upleta and Jamkandorana and six villages were selected from each of taluka. Thus, total 18 villages selected from three taluka and 10 respondents were selected randomly from each village, total 180 respondents were selected for the study. To determine farmers perceived knowledge towards chemical fertilizer use, seven-item statements were presented and assessment based on a four point *Likert-type* rating scale of very high coded 4, high coded 3, low coded 2 and very low coded 1, mean scores was calculated. For measuring the constraints, a response was recorded in the schedule itself. The frequency for each constraint was worked out and mean was calculated.

## RESULTS AND DISCUSSION

### Characteristics of Respondents

The data (Table 1) indicated that majority (59.44 %) of the respondents were from middle age group followed by 25.56 and 15.00 per cent from old and young age group, respectively. This might be due to that young age farmers moved towards urban area for other business and especially male elder were the respected members and they possess decision making power about all family matters and farming. In case of education, majority (35.56%) of the respondent were educated up to primary level

whereas, 26.67 per cent up to secondary level, 18.89 per cent up to higher secondary, 12.22 per cent were graduate and 6.67 per cent were illiterate.

The data (Table 1) revealed that about 47.22 per cent of respondents had medium size of land holding whereas, 32.22 and 20.56 per cent respondents possessed large and small size of land holding, respectively. The data about experience as Bt. cotton growers' indicated that 55.44 per cent of the respondents were from medium experience whereas 23.33 and 22.22 per cent respondents were from high and low experience as a Bt. cotton growers', respectively. This might be due to that 85.00 per cent respondents were middle and old age group.

The data regarding cotton yield index indicated that 66.33 per cent respondent were from medium cotton yield index followed by 25.56 and 16.11 per cent respondents from high and low cotton yield index, respectively. The reason behind this might be that in study area, respondents were progressive farmers as compared to other area. Majority (51.11%) of the respondents were from medium source of information while 27.78 per cent respondents were from high source of information followed by 21.11 per cent respondents had low source of information about use of chemical fertilizer in Bt. cotton. Majority (47.22 %) of the cotton growers were from medium mass media exposure; followed by 26.67 and 26.11 per cent respondents from high and low mass media exposure, respectively. This might be due to that the programmes related to agriculture are not regularly attended by the farmers. Data revealed that majority (56.67%) of the respondents had medium scientific orientation whereas 22.22 and 21.11 per cent respondents had high and low scientific orientation, respectively.

### Farmers' extent of knowledge about use of chemical fertilizer in Bt. cotton

The data (Table 2) indicate that all the respondents perceived their general knowledge level on fertilizers and its use low in the following order *i.e.* method of application of chemical

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**Table 1. Distribution of respondents according to their personal, socio economic characteristics (N=180).**

Sr. No.	Characteristic	Frequency	Percentage
1.	Age		
	Young age (Up to 35 yr)	27	15.00
	Middle age (36 to 55 yr)	107	59.44
	Old age (above 55 yr)	46	25.56
2.	Education		
	Illiterate	12	6.67
	Primary (1 to 7th std.)	64	35.56
	Secondary (8 to 10th std.)	48	26.67
	Higher Secondary (11th to 12th std.)	34	18.89
	Graduate (above 12th std.)	22	12.22
3.	Size of land holding		
	Small size (up to 1ha )	37	20.56
	Medium size (1.1 to 2 ha )	85	47.22
	Big size (above 2 ha )	58	32.22
4.	Experience as a cotton grower		
	Low experience as a cotton grower (below 5.01)	40	22.22
	Medium experience as a cotton growers (between 5.01 to 9.01)	98	54.44
	High experience as a cotton growers (more then 9.01)	42	23.33
5.	Cotton yield index		
	Low cotton yield index (Below 84.76)	29	16.11
	Medium cotton yield index (between 84.76 to 112.10)	114	63.33
	High cotton yield index (More then 112.10)	37	20.56
6.	Source of information		
	Low level of source of information (Below 22.66)	38	21.11
	Medium level of source of information (Between 22.66 to 38.43)	92	51.11
	High level of source of information (more then 38.43)	50	27.78
7.	Mass media exposure		
	Low mass media exposure (Below 4.75)	47	26.11
	Medium mass media exposure (Between 4.75 to 8.66)	85	47.22
	High mass media exposure (More then 8.66)	48	26.67
8.	Scientific orientation		
	Low scientific orientation (Below 34.40)	38	21.11
	Medium scientific orientation (Between 34.40 to 53.60)	102	56.67
	High scientific orientation (More then 53.60)	40	22.22

fertilizer (MS=1.98), time of application of different chemical fertilizer (MS=1.94), recommended dose of chemical fertilizer in Bt. cotton (MS=1.86), different type of chemical fertilizer (MS=1.85) etc. The overall mean of knowledge domain was 1.82, indicating that generally, the knowledge level of the farmers was low. This could have serious influence on the acceptance and use of fertilizer technologies among the farmers. This is because they do not understand well the technology, it is not compatible with existing practice or because they have perceived the technology to be too complicated.

**Farmers’ adoption of use of chemical fertilizer**

It was observed that adoption level was 58.88

per cent compared to non-adoption by 41.11 per cent. Low knowledge of fertilizer technology by the adopters affected proper application of recommended practices among the farmers. However, the high adoption rate irrespective of the low knowledge status of the respondents was an indication that adoption of technologies such as fertilizer is influenced by other factors other than knowledge about the technology.

**Constraints faced by cotton growers in adoption of chemical fertilizer**

The constraints were kept open ended. The responses were recorded in the schedule itself. The frequency for each constraint was worked out and

**Table2. Distribution of respondents according to their knowledge about use of chemical fertilizer in Bt. Cotton (N=180).**

Sr. No.	Knowledge level	Very High	High	Low	Very low	WMS	SD
1	Different type of chemical fertilizer	12	25	67	76	1.85	0.89
2	Method of application of chemical fertilizer in Bt. Cotton	18	28	66	68	1.98	0.96
3	Precautions measure before application	10	19	74	77	1.79	0.84
4	Recommended dose of chemical fertilizer in Bt. Cotton	14	23	66	78	1.86	0.92
5.	Time of application of different chemical fertilizer in Bt. Cotton	12	34	66	68	1.94	0.91
6.	Recommended micro nutrient chemical fertilizer in Bt. Cotton	9	16	68	87	1.71	0.83
7.	Hazards involved in chemical fertilizer	8	14	64	94	1.64	0.80
Pooled knowledge						1.82	0.88

**Table 3. Constraints faced by cotton growers in adoption of chemical fertilizer (N=180).**

Sr. No.	Constraint	Percentage	Rank
1	Non availability of fertilizer at the time of application	76.11	I
2	Inadequate information about use of chemical fertilizer	69.44	II
3	Reduced soil productivity	62.78	III
4	High cost of fertilizer	56.67	IV
5	Lack of awareness about use of micro nutrients	54.44	V
6	Lack of capital	47.22	VI

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the mean was calculated. The data was converted in to percentage. A rank was assign to each constraint and presented in table 4.

The perusal of data presented in table 3 revealed that majority of the cotton growers (76.11%) expressed non availability of fertilizer at the time of application, inadequate information about use of chemical fertilizer (69.44%) and reduced soil productivity (62.78 %). Other general constraints faced by the respondents as expressed less than 60 per cent respondents were high cost of fertilizer (56.67 %), lack of awareness about use of micro nutrients content fertilizer (54.44 %) and lack of capital (47.22 %).

### CONCLUSION

The study revealed that Bt. cotton farming is dominated by middle age group having primary level education in medium size of land holding. Majority of cotton growers were from 5 to 9 yr of experience as Bt. cotton growers' with medium yield index and medium scientific orientation. One half of the growers were from medium level of source of information and mass media exposure. Despite low level of knowledge and unfavourable opinion towards chemical

fertilizer technology, the overall adoption and use of fertilizers by the farmers was high. But chemical fertilizer usage was seriously constrained by non-availability of fertilizer at time of application and inadequate information; reduce soil productivity and high cost of fertilizer. Therefore, transforming factors such as youth in agriculture, training and practical demonstration of technologies, knowledge as well as access to subsidy facilities are required to serve as opportunity to change farmers' opinion towards chemical fertilizer use.

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Received on 23/10/2018

Accepted on 20/12/2018