



## Original Research Article

# Knowledge and Adoption Behavior of Bt Cotton Growers About Integrated Nutrient Management Practices in Yavatmal District of Vidarbha Region

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## A B S T R A C T

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Cotton is a major fiber crop and used for textile purpose by large section world's population. Cotton crop has a pivotal role in the Indian economy due to its direct and indirect employment and income generation in the agricultural and industrial sector. The study was conducted in Yavatmal district in Vidarbha region of Maharashtra State to ascertain the knowledge and adoption of integrated nutrient management practices by cotton growers. The sample size of 150 cotton growers was drawn by random sampling method. The study revealed that majority of the respondents had medium level of knowledge (61.33%) and (63.33%) adoption of integrated nutrient management practices. The study reveals that (67.00%) and (94.67%) of respondents had knowledge about soil testing and recommended dose of fertilizers; while only (34.00%) respondents expressed had knowledge about seed treatment with bio fertilizers. With regard to practice wise adoption of various integrated nutrient management practices; majority of the cultivators under study belonged to partial adoption of application of recommended dose of FYM/ha (52.67%), application of recommended dose of nitrogenous (48.00%) and phosphoric (58.67%) fertilizer dose at proper stage of crop. The analysis of correlation revealed that the variables like annual income, availability of inputs, mass media exposure, scientific motivation, economic motivation, knowledge, size of land holding and area under cotton crop had positive and significant influence on the adoption of integrated nutrient management practices in cotton crop.

## Introduction

In India, Bt cotton was released in the year 2002 by Genetic Engineering Approval Committee (GEAC) and resulted into drastic reduction in cultivation of conventional cotton. There was an exponential increase in Bt cotton area accounting for a staggering 92 per cent of the total cotton area in India. The production increased 31.20 million bales during 2010- 11 (Anon., 2014). Cotton is important cash crop in India. About 15 million farmers in the country spread across 10 states engaged in cotton cultivation over

10 million hectares area. India ranks third in global cotton production after USA and China. India accounts for approximately 25.00 percent of world's total cotton area and 16 percent of global cotton production. Per hectare yield of cotton in India is recorded as 300 kg per hectare against world average of 580 kg per hectare. Pest and diseases attack, limited irrigation, vulnerability of monsoon, application of quality inputs are affecting yield significantly.(Gandhi & Namboodiri, 2009).

The reasons for low productivity of cotton are the fluctuation in the rainfall pattern, lack of proper application of fertilizer doses, excessive use of pesticides etc. Lot of research work was carried out in the agricultural universities, cotton research institutes though majority of the farmers of this region are lag behind from use of improved technology.

Various improved cultivation practices viz. recommended seed rate, spacing, seed treatment, application of proper fertilizer dose, irrigation schedule, intercultural operations, plant protection measures, integrated nutrient management were recommended by the agriculture scientists.

Integrated nutrient supply/management (INS) aims at maintenance or tuning of soil fertility and supply of nutrients to crop at optimum level for desired crop productivity through optimization of plant nutrients in an integrated manner.

Requirement of nutrients is largely depend upon the root system and its mining ability, the availability of nutrients in the soil. The production and productivity of crop depend upon the use of quality inputs, cultivation practices and nutrient management.

The current production and productivity of cotton depicts the technological gap in knowledge and adoption. To boost up the cotton production in the region, the farming community needs to be aware about technological development and adoption of the same.

Therefore, it felt appropriate to conduct a study with the objectives to ascertain the knowledge and adoption behaviour of cotton growers about integrated nutrient management practices.

## Materials and Methods

The present study was conducted by using descriptive type of research design applying ex-post facto approach. The study was carried out purposively Yavatmal tehsil of Yavatmal district as the tehsil covered highest area under the Bt cotton. After brief consultation with Taluka Agricultural Officer and data available 10 villages from tehsil under study were selected purposively on basis of maximum area. 15 Bt cotton growers as respondents from each village selected randomly which constitute a sample size of 150 respondents.

Rogers and Shoemaker (1971) defined adoption as a decision to continue full use of an innovation. In this study, a teacher made adoption test was developed to measure the adoption of improved integrated nutrient management practices by Bt cotton growers. For ascertaining the adoption level of respondents, the 23 items of questions applicable for the adoption were prepared, the responses were elicited on three point continuum namely, complete adoption, partial adoption and non-adoption of integrated nutrient management practices with score of 2, 1 and 0 respectively. The raw score was converted into the adoption index by using following formula:

$$\text{Adoption index} = \frac{\text{Actual obtained adoption score}}{\text{Maximum obtainable adoption score}} \times 100$$

The respondents were categorized into low, medium and high level of adoption on the basis of mean  $\pm$  S.D. An interview schedule was developed for data collection and appropriate statistical tools like frequency, percentage and ranking techniques, coefficient of correlation were used for analysis of data.

## Results and Discussion

### Knowledge level of Bt cotton growers about integrated nutrient management practices of Bt cotton

Knowledge is the cognitive behavior of an individual. The body of knowledge is the product of learning process. Once the knowledge is acquired it produces changes in the thinking process of an individual which leads to further change in attitude and helps the farmer in making rational decision. Knowledge is prerequisite for adoption of any new technology. On the basis of knowledge the Bt cotton growers were classified into three levels and the data are given in Table 1.

The data with regards to level of knowledge possessed by the Bt cotton growers about recommended INM practices furnished in Table 1, it is reveals that 61.13 per cent growers had medium level of knowledge followed by 21.34 and 17.33 per cent of respondents showing high and low level of knowledge respectively.

### Adoption level of Bt cotton growers about integrated nutrient management practices of Bt cotton

The adoption of any technology is largely depends upon awareness and knowledge about the particular technology. Adoption is not possible without the awareness and knowledge. Increased awareness leads towards the adoption process.

On the basis of adoption index the respondents were classified into three levels and data of the same are presented in Table 2. It was observed that majority of Bt cotton growers (63.33%) belongs to medium adoption level whereas 18.67 per cent Bt cotton growers were showed high level of

adoption of integrated nutrient management practices while 18.00 per cent Bt cotton growers were seed in low level of adoption group of integrated nutrient management practices. Thus, it could be inferred that, majority of the Bt cotton growers had medium level of adoption of integrated nutrient management practices. Our findings were supported by the findings of Landge(2001) and Bodake (2003).

### Practice wise knowledge of integrated nutrient management technology by cotton growers

Without sufficient knowledge to the individual it is very difficult to convince the farmers for adoption of any improved technology. Knowledge is the prerequisite condition for adoption.

The data regarding the knowledge of Bt cotton growers was collected and analyzed with application of statistical tools. The depicted in the Table 3 shows that majority of the respondents were had knowledge about importance of soil testing (67.33%), almost equal per cent age of Bt cotton growers expressed their sufficient knowledge towards application recommended dose of FYM/ha for Bt cotton crop (68.00%); with regard to the recommended dose of application of nitrogenous fertilizers (94.67 %) and time of application of nitrogenous fertilizers (93.33%) respondents reported good knowledge towards the practice. Majority of the respondents (74.00%) showed knowledge about use of 2% urea at the time of flowering to the Bt cotton crop. Comparatively low proportion of the respondents (34.00%) and (44.67%) were had proper knowledge towards use of biofertilizers for the seed treatment and recommended dose of potassium fertilizers for Bt cotton crop.

**Table.1** Distribution of the respondents according to their knowledge level about integrated nutrient management practices of Bt cotton

| Sr. No. | Category     | Respondents (n=150) |               |
|---------|--------------|---------------------|---------------|
|         |              | Frequency           | Percentage    |
| 1.      | Low          | 26                  | 17.33         |
| 2.      | Medium       | 92                  | 61.33         |
| 3.      | High         | 32                  | 21.34         |
|         | <b>Total</b> | <b>150</b>          | <b>100.00</b> |

$\bar{X} = 41.75$

S.D. = 14.31

**Table.2** Distribution of respondents according to their adoption level about integrated nutrient management practices

| Sr. No. | Category     | Respondents (n=150) |               |
|---------|--------------|---------------------|---------------|
|         |              | Frequency           | Percentage    |
| 1.      | Low          | 27                  | 18.00         |
| 2.      | Medium       | 95                  | 63.33         |
| 3.      | High         | 28                  | 18.67         |
|         | <b>Total</b> | <b>150</b>          | <b>100.00</b> |

$X = 50.57$

S.D. = 17.6

**Table.3** Distribution of the respondents according to their practice wise knowledge of INM practices of Bt cotton

| INM Practices  | Knowledge (n=150) |       |
|--|-------------------|-------|
|  | Frequency         | %     |
| Soil testing   | 101               | 67.33 |
| Recommended dose of FYM/ha application in Bt cotton field. | 102               | 68.00 |
| Time of application of FYM                                 | 116               | 77.33 |
| Recommended dose of vermicompost                           | 94                | 62.67 |
| Seed treatment with bio fertilizers                        | 51                | 34.00 |
| Recommended dose of nitrogenous fertilizer for Bt cotton   | 142               | 94.67 |
| Time of application of nitrogenous fertilizers             | 140               | 93.33 |
| Spraying of 2% urea at time of flowering                   | 111               | 74.00 |
| Recommended dose of phosphoric fertilizers                 | 78                | 52.00 |
| Recommended dose of potassium fertilizer                   | 67                | 44.67 |

\*figures in parenthesis indicate percentage

**Table.4** Distribution of the respondents according to their practice wise adoption of INM practices of Bt cotton

| INM Practices                                  | Adoption (n=150) |           |             |
|--|------------------|-----------|-------------|
|  | Complete         | Partial   | No adoption |
| Soil testing                                   | 48(32.00)        | 53(35.33) | 49(32.67)   |
| Recommended dose of FYM/ha                     | 57(38.00)        | 79(52.67) | 14(09.33)   |
| Time of application of FYM                     | 51(34.00)        | 70(46.67) | 29(19.33)   |
| Recommended dose of vermicompost               | 24(16.00)        | 88(58.67) | 38(25.33)   |
| Seed treatment                                 | 25(16.67)        | 56(37.33) | 69(46.00)   |
| Recommended dose of nitrogenous fertilizer     | 65(43.33)        | 77(51.34) | 08(05.33)   |
| Time of application of nitrogenous fertilizers | 69(46.00)        | 72(48.00) | 09(06.00)   |
| Spraying of 2% urea at time of flowering       | 43(28.67)        | 65(45.33) | 42(28.00)   |
| Recommended dose of phosphoric fertilizers     | 38(25.33)        | 88(58.67) | 24(16.00)   |
| Recommended dose of potassium fertilizer       | 39(26.00)        | 56(37.33) | 55(36.67)   |

\*figures in parenthesis indicate percentage

#### **Practice wise adoption of integrated nutrient management technology by cotton growers.**

The practice wise adoption of integrated nutrient management technology by the cotton growers is presented in the Table 4.

It was observed that only 32.00 per cent of the Bt cotton growers were testing the nutrient status of soil before cultivation of crop while (35.33%) and (32.67%) of the respondents had found in partial and non-adopters category. Application of recommended dose of FYM/ha was followed and completely adopted by (38.00%) Bt cotton growers; whereas slightly more than half of the respondents

i.e. 52.67 per cent was found in partial adoption category. With regard to the other INM practices such as, application of recommended dose of nitrogenous fertilizers (43.33%); proper time for the application of nitrogenous fertilizers (46.00%) of the respondents had shown compete adoption of these INM practices.

Whereas application of recommended dose of vermicomposting and application of bio fertilizers for the seed treatment to the cotton seed equal number of respondents i.e. around 16.00 per cent reported complete adoption of these INM practices. It was revealed that large proportion of the respondents i.e. (45.33%) had reported partial adoption for spraying of 2% urea to the cotton crop at the flowering stage. It was

followed by around one forth per cent age of the respondents i.e around (25.00%) had completely adopted use of the recommended dose of phosphoric fertilizers and potassium fertilizer. Majority of the respondents had seen in low adoption level for the above mentioned recommended integrated nutrient management practices; the reason may be lack of knowledge and awareness about the benefits of INM for the cotton crop.

The finding of the study led to the conclusion that the knowledge level and adoption status of integrated nutrient management practices by the Bt cotton growers was observed in the medium category. With regard to the practice wise knowledge of different INM practices majority of the respondents reported sufficient soil testing, use of recommended dose and time of application of nitrogenous fertilizer for the Bt cotton crop. Comparatively low proportion of respondents expressed knowledge about use of biofertilizers for the seed treatment and recommended dose of potassium fertilizers; whereas about half of the respondents had found in partial adoption of these above mention practices.

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