

Original Research Article

<https://doi.org/10.20546/ijcmas.2019.804.227>

Knowledge Level of Tenant Farmers on Recommended Package of Practices in Bt Cotton

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ABSTRACT

The study was conducted in Andhra Pradesh state during 2017-18. A total of 120 *Bt* cotton tenant farmers were selected randomly for the study. Data was collected by interview schedule. Majority (65.83%) of the *Bt* cotton tenant farmers had medium knowledge, followed by low (17.50%) and high (16.67%) level of knowledge regarding recommended package of practices in *Bt* cotton. This can be inferred that 75 to 100 per cent of the *Bt* cotton tenant farmers had knowledge regarding the development of *Bt* cotton for management of bollworms, magnesium deficiency symptoms, purpose of refuge crop, critical stages for irrigation, and topping. It is observed that only 50 to 75 per cent of the *Bt* cotton tenant farmers had knowledge about full form of ZBNF, Purpose of crop rotation, deficiency symptoms of nitrogen, pheromone traps, herbicides. It can be inferred that only 25 to 50 per cent of the *Bt* cotton tenant farmers had knowledge about the practices such as recommended dosage of fertilizers, pesticides, neem seed extract, imidacloprid, purpose of *Trichogramma*, deficiency symptoms. Results shows that very less percent of *Bt* cotton tenant farmers had low knowledge about soil testing recommended dose usage (15.83%) and recommended bio-fertilizer for *Bt* cotton (14.17%).

Keywords

Knowledge, Bt cotton tenant farmers

Article Info

Accepted:

15 March 2019

Available Online:

10 April 2019

Introduction

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). 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. *Bt* cotton is genetically engineered cotton, which contains a gene taken from a soil bacterium (*Bacillus thuringiensis*) to produce toxins in the plants. 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.

To achieve the higher level of production and productivity the inadequate level of knowledge 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 knowledge level on recommended package of practices of tenant farmers in *Bt* cotton.

Materials and Methods

The investigation was carried out during the year 2017 in Guntur district of Andhra Pradesh by adopting ex-post facto research design. The state of Andhra Pradesh was selected purposively 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 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 beneficiaries selected from 12 selected villages. The data was collected through well structured interview schedule, which was coded, tabulated and analysed and presented in tables to make findings meaningful and easily understandable.

Table 1 showed that majority (65.83%) of the *Bt* cotton tenant farmers had medium knowledge, followed by low (17.50%) and high (16.67%) level of knowledge regarding recommended package of practices in *Bt* cotton.

The possible reason for medium level of knowledge might be due to the fact that majority of the *Bt* cotton tenant farmers had contact with extension agencies like MPEOs and AEOs, medium mass media exposure and their interest in gaining knowledge about *Bt* cotton production technologies. It is quite interesting to note that some of the *Bt* cotton tenant farmers had low level of knowledge regarding *Bt* cotton production technologies. So, the department of agriculture, extension agencies should conduct demonstrations, field visits, study tours, and training programmes to impart knowledge. This finding was in agreement with the findings of Sarada and Kumar (2013).

The findings in this table 2 revealed that that 75 to 100 per cent of the *Bt* cotton tenant farmers had knowledge about production technology in the percentage order of their decreasing importance are, development of *Bt* cotton for the management of Bollworms (90.00%) was ranked first, followed by name of the *Bt* cotton hybrid grown by the farmer (83.33%), resistance of *Bt* cotton to pests (82.50%), purpose of refuge crop (78.33%),

critical stages for irrigation in *Bt* cotton (77.50%), magnesium deficiency symptoms (76.67%), purpose of topping of branches (76.67%), protection against bollworms for 90-100 days (75.00%), trap crop for *Spodoptera* (75.00%). This can be inferred that 75 to 100 per cent of the *Bt* cotton tenant farmers had knowledge regarding the development of *Bt* cotton for management of bollworms, magnesium deficiency symptoms, purpose of refuge crop, critical stages for irrigation, and topping. The reason might be because they were very easy to understand and they were very basic practices need to be understood by the farmers.

An overview of the table 2 also revealed that 50 to 75 per cent of the *Bt* cotton tenant farmers had knowledge about production technology in the percentage order of their decreasing importance are, full form of ZBNF (73.33%), purpose of crop rotation (72.50%), symptoms of magnesium deficiency (70.83%), purpose of naphthalic acetic acid (65.83%), trap crop for *Helicoverpa* (65.00%), meaning of refuge technique (65.00%), recommended dose of farm yard manure (65.00%), recommended seed rate per acre (64.17%), deficiency symptoms of zinc (64.17%), recommended dose of magnesium sulphate (64.17%), control measure for Mealybug (64.17%), number of pheromone traps required per one acre (62.50%), deficiency symptoms of nitrogen (60.83%), recommended dose of urea for foliar application (57.50%), non selective post-emergence herbicide recommended for *Bt* cotton (57.50%), cause for the development of purple leaf (55.83%), recommended control measure for the management of Grey mildew (55.83%), purpose of yellow sticky traps (55.00%), recommended pre-emergence herbicide (53.33%), purpose of intercropping *Bt* cotton with pulses (52.50%), recommended spacing (51.67%), recommended ratio of monocrotophos and water for stem application (51.67%).

This can be inferred that only 50 to 75 per cent of the *Bt* cotton tenant farmers had knowledge about full form of ZBNF, Purpose of crop rotation, deficiency symptoms of nitrogen, pheromone traps, herbicides *etc.*, because pheromone traps are not available at the local markets, deficiency symptoms are difficult to identify, lack of faith, awareness on the Zero Budget Natural Farming (ZBNF) and they felt that some of the practices mentioned above are difficult to understand because of their illiteracy.

It also further revealed that 25 to 50 per cent of the *Bt* cotton tenant farmers had knowledge about production technology in the percentage order of their decreasing importance are, intercrop used in *Bt* cotton (49.17%), recommended dose of nitrogen (47.50%), number of rows of non-*Bt* cotton used as refuge crop (46.67%), recommended dose of potassium (40.00%), year of introduction of *Bt* cotton in Andhra Pradesh (39.17%), cause for the appearance of silvery white patches on lower side of leaves (36.67%), first genetically modified crop introduced for commercial cultivation (36.67%), purpose of releasing egg parasitoids like *Trichogramma* (35.83%), recommended dose of phosphorus (35.83%), appropriate time for application of phosphatic fertilizers (34.17%), deficiency symptoms of boron (33.33%), recommended dose of neem seed kernel extract against sucking pests and borers (32.50%), recommended ratio of imidacloprid and water for stem application (31.67%), purpose of blue sticky traps (30.83%), stem application is effective up to 40 to 50 days (29.17%), chemical recommended for the management of boll rot (27.50%), economic threshold level for Jassids per leaf (25.83%).

It can be inferred that only 25 to 50 per cent of the *Bt* cotton tenant farmers had knowledge about the practices such as recommended dosage of fertilizers, pesticides, neem seed extract, imidacloprid, purpose of

Trichogramma, deficiency symptoms etc. because recommended dosages are scientific oriented and lack of awareness regarding these technologies. So, there is a need to train farmers regarding recommended doses and deficiency symptoms by the department of agriculture and ANGRAU. The table 2 shows that very less per cent of *Bt* cotton tenant farmers had low knowledge about soil testing

recommended dose usage (15.83%), recommended bio-fertilizer for *Bt* cotton (14.17%).

Very few farmers had knowledge about soil testing, bio-fertilizers. It might be due to lack of exposure to new technology and lack of interest of farmers towards bio-fertilizers as they are not showing immediate results.

Table.1 Distribution of *Bt* cotton tenant farmers according to their knowledge level on recommended package of practices

(n=120)

| S.No. | Category | <i>Bt</i> cotton tenant farmers | |
|-------------------|----------------------|---------------------------------|------------|
| | | Frequency | Percentage |
| 1 | Low(<20.42) | 21 | 17.50 |
| 2 | Medium (20.42-33.70) | 79 | 65.83 |
| 3 | High(>33.70) | 20 | 16.67 |
| | Total | 120 | 100.00 |
| Mean=27.06 | | SD=6.64 | |

Table.2 Content analysis of knowledge level on production technology of *Bt* cotton tenant farmers

(n=120)

| S. No. | Particulars* | Knowledge | | | | Rank |
|--------|--|-----------|-------|-----------|-------|------|
| | | Correct | | Incorrect | | |
| | | F | % | F | % | |
| 1 | <i>Bt</i> cotton protects the crop against bollworm for 90-100 days only during cotton crop growth period. | 90 | 75.00 | 30 | 25.00 | 8 |
| 2 | Refuge crop is to be maintained in <i>Bt</i> cotton cultivation to delay the development of resistance in bollworms against <i>Bt</i> toxin. | 94 | 78.33 | 26 | 21.67 | 4 |
| 3 | <i>Bt</i> cotton was developed for the management of bollworms in cotton. | 108 | 90.00 | 12 | 10.00 | 1 |
| 4 | Castor is a trap crop for <i>Spodoptera</i> . | 90 | 75.00 | 30 | 25.00 | 8 |
| 5 | Spacing used in <i>Bt</i> cotton in your area is 36-48 inches between row to row and 18-24 inches between plant to plant. | 62 | 51.67 | 58 | 48.33 | 30 |
| 6 | The recommended quantity of seed per acre for sowing <i>Bt</i> cotton is 750 g -1 Kg/acre | 77 | 64.17 | 43 | 35.83 | 17 |
| 7 | Intercrop used in <i>Bt</i> cotton. | 59 | 49.17 | 61 | 50.83 | 32 |
| 8 | Leaf reddening is the deficiency | 92 | 76.67 | 28 | 23.33 | 6 |

| | | | | | | |
|----|--|----|-------|-----|-------|----|
| | symptom of magnesium | | | | | |
| 9 | Interveinal chlorosis is the deficiency symptom of zinc. | 77 | 64.17 | 43 | 35.83 | 17 |
| 10 | The recommended dose of Nitrogen per acre of <i>Bt</i> cotton is 60 Kg N /ac. | 57 | 47.50 | 63 | 52.50 | 33 |
| 11 | The recommended dose of Phosphorus per acre of <i>Bt</i> cotton is 24 Kg P/ac. | 43 | 35.83 | 77 | 64.17 | 39 |
| 12 | The recommended dose of Potassium per acre of <i>Bt</i> cotton is 24 Kg K/ac. | 48 | 40.00 | 72 | 60.00 | 35 |
| 13 | If a soil test shows that the nutrient content in your soil is low, then you should use 25 per cent more amount of the fertilizers than the original recommended dosage. | 19 | 15.83 | 101 | 84.17 | 49 |
| 14 | 5 per cent of Neem Seed Kernel Extract (NSKE) is used against sucking pests and borers in <i>Bt</i> cotton. | 39 | 32.50 | 81 | 67.50 | 43 |
| 15 | Recommended dosage of magnesium sulphate in <i>Bt</i> cotton is 10g MgSO ₄ /1 Lit water. | 77 | 64.17 | 43 | 35.83 | 17 |
| 16 | <i>Bt</i> cotton is the first genetically modified crop that was introduced for commercial cultivation in India. | 44 | 36.67 | 76 | 63.33 | 37 |
| 17 | Yellowing of leaves coupled with reduction in leaf size is the deficiency symptom of nitrogen. | 73 | 60.83 | 47 | 39.17 | 22 |
| 18 | The stages that are critical for irrigation in <i>Bt</i> cotton are boll formation and boll development. | 93 | 77.50 | 27 | 22.50 | 5 |
| 19 | The recommended dose of urea for foliar application in <i>Bt</i> cotton is 2 per cent (20g/1litre) for nitrogen deficiency. | 69 | 57.50 | 51 | 42.50 | 23 |
| 20 | Marigold is a trap crop for <i>Helicoverpa</i> . | 78 | 65.00 | 42 | 35.00 | 14 |
| 21 | Flower drop could be controlled by spraying of Naphtalic Acetic Acid. | 79 | 65.83 | 41 | 34.17 | 13 |
| 22 | <i>Bt</i> cotton is not resistant to all pests of cotton. | 99 | 82.50 | 21 | 17.50 | 3 |
| 23 | The Economic Threshold Level (ETL) for Jassids for <i>Bt</i> cotton is 2 Jassids per leaf. | 31 | 25.83 | 89 | 74.17 | 48 |
| 24 | Purpose of topping of branches in <i>Bt</i> cotton at 18-20 sympodial branches stage is one of the important components of IPM in <i>Bt</i> cotton. | 92 | 76.67 | 28 | 23.33 | 6 |
| 25 | Pendimethalin is a pre-emergence | 64 | 53.33 | 56 | 46.67 | 28 |

| | | | | | | |
|----|---|-----|-------|-----|-------|----|
| | herbicide recommended for <i>Bt</i> cotton. | | | | | |
| 26 | Crop rotation with Jowar/ Soybean/ Foxtail millet reduces the pest population. | 87 | 72.50 | 33 | 27.50 | 11 |
| 27 | Four pheromone traps are required per one acre. | 75 | 62.50 | 45 | 37.50 | 21 |
| 28 | Name of the <i>Bt</i> cotton hybrid that was grown by you. | 100 | 83.33 | 20 | 16.67 | 2 |
| 29 | Intercropping with pulses reduces the incidence of sucking pests. | 63 | 52.50 | 57 | 47.50 | 29 |
| 30 | The recommended dose of farm yard manure per acre of <i>Bt</i> cotton is 5 t/ac. | 78 | 65.00 | 42 | 35.00 | 14 |
| 31 | Year of introduction of <i>Bt</i> cotton cultivation in Andhra Pradesh is 2002. | 47 | 39.17 | 73 | 60.83 | 36 |
| 32 | Release of egg parasitoid like <i>Trichogramma</i> @ 60,000/ ha reduces <i>Helicoverpa</i> egg masses. | 43 | 35.83 | 77 | 64.17 | 39 |
| 33 | Appropriate time for application of phosphatic fertilizer for <i>Bt</i> cotton. | 41 | 34.17 | 79 | 65.83 | 41 |
| 34 | Blue sticky traps are used for control of thrips. | 37 | 30.83 | 83 | 69.17 | 45 |
| 35 | The recommended bio-fertilizers for <i>Bt</i> cotton is <i>Azotobacter</i> , <i>Azospirillum</i> , <i>Pseudomonas</i> . | 17 | 14.17 | 103 | 85.83 | 50 |
| 36 | Full form of ZBNF. | 88 | 73.33 | 32 | 26.67 | 10 |
| 37 | Refuge technique is the growing of non- <i>Bt</i> cotton on the periphery of <i>Bt</i> cotton. | 78 | 65.00 | 42 | 35.00 | 14 |
| 38 | Five rows of non- <i>Bt</i> cotton used as a refuge crop around <i>Bt</i> cotton. | 56 | 46.67 | 64 | 53.33 | 34 |
| 39 | Paraquat is a non-selective post-emergence herbicide recommended in <i>Bt</i> cotton. | 69 | 57.50 | 51 | 42.50 | 23 |
| 40 | Yellow sticky traps are used for the management of whitefly in <i>Bt</i> cotton. | 66 | 55.00 | 54 | 45.00 | 27 |
| 41 | Appearance of silvery white patches on the lower side of the leaves is the symptoms of Thrips in cotton. | 44 | 36.67 | 76 | 63.33 | 37 |
| 42 | Stem application of monocrotophos is effective up to 40 to 50 days for control of sucking pests in <i>Bt</i> cotton. | 35 | 29.17 | 85 | 70.83 | 46 |
| 43 | The recommended ratio of imidacloprid and water for stem application is 1:20. | 38 | 31.67 | 82 | 68.33 | 44 |
| 44 | The recommended ratio of Monocrotophos and water for stem application is 1:4. | 62 | 51.67 | 58 | 48.33 | 30 |

| | | | | | | |
|----|---|----|-------|----|-------|----|
| 45 | The chemicals that are recommended for the management of boll rot in <i>Bt</i> cotton Streptocyclin and Copper Oxychloride. | 33 | 27.50 | 87 | 72.50 | 47 |
| 46 | Mealybug could be controlled by spraying of profenophos. | 77 | 64.17 | 43 | 35.83 | 17 |
| 47 | Purple leaf of cotton is caused due to phosphorous deficiency. | 67 | 55.83 | 53 | 44.17 | 25 |
| 48 | In cotton Magnesium deficiency symptoms are observed first on older lower leaves. | 85 | 70.83 | 35 | 29.17 | 12 |
| 49 | Distorted, stunted and abnormal terminal uppermost leaves with aborted flowers are the deficiency symptoms of boron. | 40 | 33.33 | 80 | 66.67 | 42 |
| 50 | Carbendazim is the recommended fungicide for the management of grey mildew. | 67 | 55.83 | 53 | 44.17 | 25 |

* Multiple response format

F=Frequency

%=Percentage

The results regarding the knowledge level on the recommended production technology of *Bt* cotton tenant farmers reveal the importance of conducting demonstrations, farmer-scientist interactions, training programmes, exposure visits for increasing the knowledge of farmers related to *Bt* cotton production technology, thereby increasing the adoption rate of recommended production technology. So, the department of agriculture should conduct above extension activities for improvement.

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How to cite this article:

Kantheti Vysali, P. Rambabu, B. Mukunda Rao and Radha Krishna Murthy, V. 2019. Knowledge Level of Tenant Farmers on Recommended Package of Practices in *Bt* Cotton. *Int.J.Curr.Microbiol.App.Sci*. 8(04): 1940-1946. doi: <https://doi.org/10.20546/ijcmas.2019.804.227>