Knowledge and Adoption of Drip Irrigation System and Its Management Practices by Bt Cotton Growers in Parbhani District of Maharashtra

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Original Research Article

ABSTRACT

There is a water scarcity problem in Marathwada region of Maharashtra, and cotton is the major crop in the region which required water very precisely at every stage. As a result, it was thought that the research would be very useful in determining the level of knowledge and adoption of drip irrigation system of Bt cotton growers. The study was conducted in Parbhani district of Marathwada region of Maharashtra state. A total number of 120 respondents were selected by purposive sampling from 12 villages under Selu, Jintur and Pathri Taluka as they have highest area in drip irrigation in Bt Cotton. Descriptive research design was adopted for the study and data were collected by personal interview method by using pre structured interview schedule. The findings of the study reveal that the majority (75.83 per cent) of the respondents had medium level of knowledge about drip irrigation system followed by 15 per cent and 9.17 per cent of the respondents having low and high level of knowledge, respectively. It also reveals that 61.67 per cent respondents of had medium level of adoption of recommended management practices related to drip irrigation system for Bt cotton followed by 24.16 per cent respondents having a low level of adoption and 14.66 per cent had high level of adoption. It was found that independent variables i.e., education, size of land holding, area under drip irrigation, annual income, source of

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information, social participation, mass media exposure, risk orientation and economic motivation were positively and significantly related to the dependent variable, i.e., knowledge and adoption of management practices of drip irrigation for Bt-cotton.

1. INTRODUCTION

Cotton is an important cash crop in India. About 15 million farmers in the country, spread across ten states, are 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 per cent world's total cotton area and 16 per cent 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 attacks, limited irrigation, monsoon vulnerability and the use of quality inputs all have a significant impact on yield [1].

Bt cotton is genetically engineered with Bt (Bacillus thuringensis), a biotoxin that comes from soil bacterium. Bt which isolated from soil in 1911, has been available to farmers as an organic pesticide since 1930 [2]. Bt cotton offers protection from boll worms right from the early days of crop, leading to a healthy crop, better boll retention, greater harvest and more profit. Bt cotton is an insect- resistant transgenic crop designed to combat the bollworm. Bt cotton was created by genetically altering the cotton genome to express a microbial protein from the bacterium Bacillus thuringiensis. In short, the transgene inserted into the plant's genome produces toxin crystals that the plant would not normally produce, which, when ingested by a certain population of organisms, dissolve the gut lining, leading to the organism's death.

Efficient management of water is of utmost importance for sustaining and enhancing agricultural production. While there is demand to bring more area under assured irrigation, availability of water for irrigation is expected to diminish in coming years due to competing demand for other uses. As compared to surface water, a greater proportion of irrigation water comes from the ground water, and this source is increasingly being exploited in an unscientific manner. Thus, the importance of scientific water management and the need to adopt advanced techniques such as drip irrigation to enhance productivity and water-use efficiency of field crops became imperative [3]. It has been proven over time that drip irrigation can result in more than 50 per cent saving in water application with high levels of water- use efficiencies for a wide range of crops. Drip irrigation has added advantages because it can also be used to apply any water-soluble fertilizer or chemical in precise amounts, and when required to match the plant needs or any other agronomic management [4].

With drip irrigation water can be applied very precisely and frequently. In this context, the present research seeks to investigate the knowledge level and adoption level of drip irrigation management practices by Bt cotton growers [5]. Based on the case of local peoples of Marathwada region, this research aims to capture the extent of local peoples' adoption of drip irrigation management practices and the type of adjustments they have made in their farming practices in response to these changes [6]. The investigation will be carry out in the Marathwada region during the years 2020-21and 2021-2022.

2. RESEARCH METHODOLOGY

A descriptive research design was adopted for the study as it describes the characteristics or phenomena that are being studied. The Parbhani district of the Marathwada region of Maharashtra was selected for the present study because large number of farmers are Bt Cotton growers in the district and the researcher is well acquainted with the locality and culture. Out of 9 talukas of Parbhani districts, Selu, Jintur and Pathri were selected by purposive sampling as they have highest area under drip irrigation in Bt Cotton. From the selected block, twelve villages were selected purposively considering the availability of drip irrigation sets and highest hectarage under Bt cotton crop. Ten respondents from twelve village were identified through a purposive sampling technique which constitute a total number of 120 respondents. The information was elicited from respondents with the help of structured interview schedule. Pencil, pen and camera was also used during data collection. Primary data was collected with the help of personal interview schedule with specially focused objectives for the study. Secondary data

was collected from library, journal, book and other materials related to study. The entire data set was further transformed into a score for tabulation and subjected to appropriate statistical methods like frequency distribution, percentage analysis, mean and SD.

3. RESULTS AND DISCUSSION

The data presented in Table 1 revealed that the majority (75.83 per cent) of the respondents had a medium level of knowledge about drip irrigation system followed by 15 per cent and 9.17 per cent of the respondents having low and high level of knowledge, respectively. The medium knowledge level of majority of the respondents among the Bt cotton growers might be due to the fact that the farmers might have been exposed to the different communication channels of information sources.

Similar result were reported by Verma et al. [7] and Muddam et al. [8].

It is elucidated from Table 2 that 61.67 per cent of respondents had a medium level of adoption of recommended management practices related to drip irrigation systems for Bt cotton, followed by 24.16 per cent of respondents having a low level of adoption and 14.66 per cent had high level of adoption. The medium adoption level of the respondents might be due to the fact that farmers had medium to low level of knowledge, medium education, medium area under Bt cotton, medium sources of information, medium mass media exposure, medium level of social participation, medium level of risk orientation and medium economic motivation. Similar result were reported by Neethi and Sailaja [9], Himdari et al. [10] and Verma & Sharma [11].

Table 1. Distribution of the respondents according to their overall knowledge level

| Sr. No.	Knowledge Level	Frequency (N=120)	Percentage
1	Low (Score up to 5)	18	15.00
2	Medium (Score 6 to 10)	91	75.83
3	High (Score 11 and above)	11	9.17
	Total	**120**	**100.00**

Mean=7.65; SD =2.33
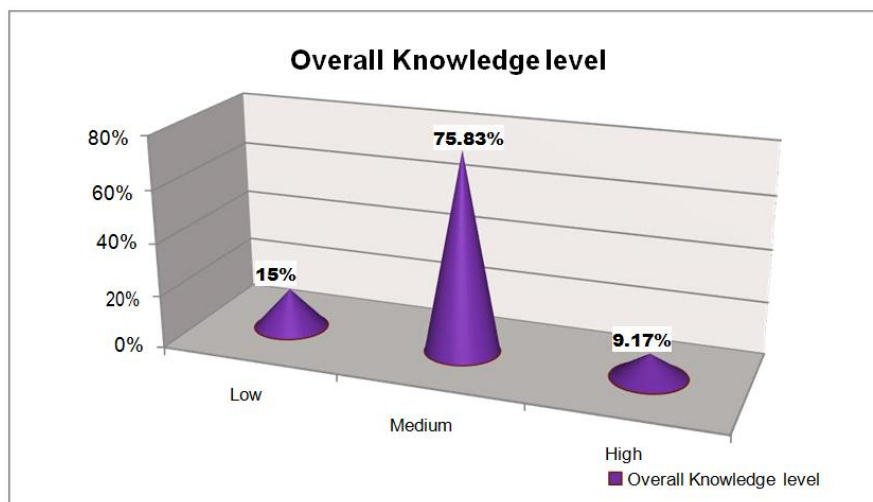
Fig. 1. Distribution of respondent Bt cotton growers according to their overall knowledge level

Table 2. Distribution of the respondents according to their overall adoption level

Sr. No.	Adoption Level	Frequency (N=120)	Percentage
1	Low (Score up to 24)	29	24.16
2	Medium (Score 25 to 31)	74	61.67
3	High (Score 32 and above)	17	14.66
	Total	**120**	**100.00**

Mean=27.83; SD =3.79
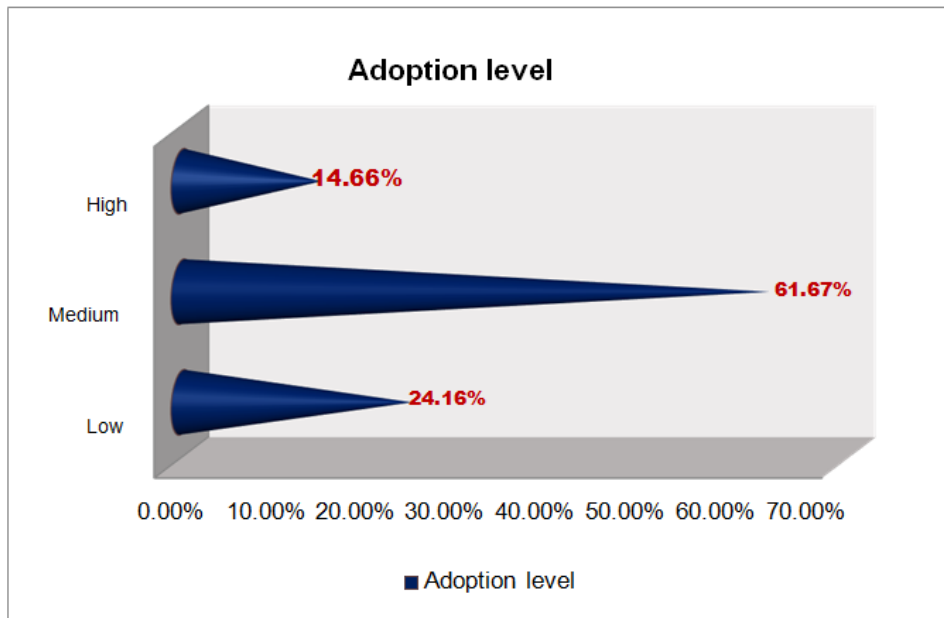
Fig. 2. Distribution of respondent Bt cotton growers according to their level of adoption of drip irrigation system

Table 3. Relationship between profile of Bt cotton growers with knowledge

Sr. No.	Independent variable	Correlation coefficient (r)
1.	Age	-0.188*
2.	Education	0.155*
3.	Land holding	0.143*
4.	Area under Bt cotton	0.197*
5.	Sources of irrigation	0.178*
6.	Annual income	0.259*
7.	Source of information	0.322**
8.	Social participation	0.200**
9.	Mass media exposure	0.159*
10.	Risk orientation	0.213*
11.	Economic motivation	0.126*

* Significant at 0.05 per cent level of probability
** Significant at 0.01 per cent level of probability

It is observed from the Table 3 that education, size of land holding, area under drip irrigation, annual income, source of information, social participation, mass media exposure, risk orientation and economic motivation were positively and significantly related with knowledge of management practices of drip irrigation for Bt-cotton.

Age, on the other hand, was found to have a negative significant relationship with knowledge of drip irrigation management practices for Bt-cotton.

It is observed from Table 4 that, education, size of land holding, area under drip irrigation, source of irrigation, annual income, source of information, social participation, mass media exposure, risk orientation and economic motivation were positively and significantly related with adoption of management practices of drip irrigation for Bt-cotton.

Whereas age had a negative significant relationship with the adoption of drip irrigation management practices for Bt-cotton.

Table 4. Relationship between profile of Bt cotton growers with adoption

Sl. No.	Independent variable	Correlation coefficient (r)
1.	Age	-0.217*
2.	Education	0.377*
3.	Land holding	0.224*
4.	Area under Bt cotton	0.158*
5.	Sources of irrigation	0.136*
6.	Annual income	0.156*
7.	Source of information	0.411**
8.	Social participation	0.529**
9.	Mass media exposure	0.579*
10.	Risk orientation	0.524*
11.	Economic motivation	0.282*

* Significant at 0.05 per cent level of probability
** Significant at 0.01 per cent level of probability

4. CONCLUSION

It was concluded that most of the Bt cotton growers had medium level of overall knowledge and adoption of the recommended drip irrigation system and its management practices. Socio economic characteristics like education, size of land holding, area under drip irrigation, source of irrigation, annual income, source of information, social participation, mass media exposure, risk orientation, economic motivation were positively, and significantly related with adoption of management practices of drip irrigation for the Bt cotton. Whereas age had a negative significant relationship with the adoption of drip irrigation management practices for Bt-cotton. Size of land holding, area under drip irrigation, annual income, source of information, social participation, mass media exposure, risk orientation and economic motivation were positively and significantly related with knowledge of management practices of drip irrigation for Bt cotton. Whereas, age was having negatively significant relationship with knowledge of management practices of drip irrigation for Bt-cotton. It is recommended that there should be regular visit of dealers or suppliers for supervision and evaluation of drip irrigation system and training should be provided for improving knowledge and skill level of the respondents.

CONSENT

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

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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