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OBSTACLES EXPERIENCED IN PRACTISING IMPROVED AGRICULTURAL METHODS TO OVERCOME THE ADVERSE EFFECTS OF CLIMATE CHANGE

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ABSTRACT

India is one of the seventh largest countries in the world with an area of 3,287,263 square kilometers. Its growth rate is 1.1% and current population is more than 130 crores. So, this population requires more food as a result of dependence on the agricultural sector. Around 50-60% of Indian population directly or indirectly depends on agriculture. India is one of the most vulnerable countries to climate change, which have negative effects on the agricultural sector. A lot of improved agricultural practices like mixed cropping, intercropping, organic farming, use of bio-fertilizers are suggested for farmers to overcome the negative effects of climate change. However the farmers are perceiving a lot of constraints in adopting the improved practices. This study attempted at analyzing the constraints experienced by the cotton cultivators in adopting the improved agricultural practices to mitigate the adverse effects of climate change. The major constraints perceived by the respondents in adopting the improved agricultural practices in cotton cultivation for mitigating the adverse effects of climate change includes, 'pest and disease attack', 'failure of seasonal rainfall', 'non-availability of labour', 'high cost of labour', 'high cost of inputs', 'lack of suitable weed control measures', 'lack of remunerative price for the produce', 'poor information on early warning systems', 'lack of good extension agency services', 'lack of information about climate change', 'inadequate credit facilities', 'lack of access to weather forecast technologies' etc.,

Keywords: Constraints, Improved agricultural methods, Adverse effects, Climate change.

Introduction

Agriculture and climate change

Agriculture is inherently sensitive to climate changes and is one of the most vulnerable sectors. Climate change directly affects agricultural production efficiency. Because of climate change, agriculture is affected in terms of productivity, agricultural practices, environmental effects, rural space and adaptation. Climate change is projected to have serious impacts on different sectors of Indian economy especially the agricultural sector, with rural farmers heavily affected since they depend largely on rainfall for their livelihood (Ndambiri *et al.*, 2013; Billah, *et al.*, 2015). Agricultural Extension has a major role to play in helping farmers to adapt and mitigate climate change (Kanagasabapathi and Sakthivel, 2019; Sesenlo Kath *et al.*, 2020). World agriculture faces a serious decline within the century due to global warming. Overall, agricultural productivity for the entire world is projected to decline between 3 and 16% by 2080. Developing countries, many of which have an average temperature that are already near or above crop tolerance levels, are predicted to suffer an average 10 to 25% decline in agricultural productivity. Individual developing countries face larger declines. India, for example, could see a drop of 30 to 40%. Developing countries like India are more vulnerable to climate change than developed countries because of the predominance of agriculture in their

economies and scarcity of capital for adaptation measures. A lot of improved agricultural practices like mixed cropping, intercropping, organic farming, use of bio-fertilizers are suggested for farmers to overcome the negative effects of climate change.

Cotton

Agriculture is one of the main contributors to Indian economy. Cotton (*Gossypium hirsutum*) is a globally an important fibre plant. Cotton is one of the vital commercial fibre crops, playing prominent role in the national and international economy.

It is an important commercial fibre and cash crop which plays a dominant role in the industrial and agricultural economy of a country. There are about 90 cotton producing countries in world. The top cotton producing countries include India, China, United States, Brazil and Pakistan. Cotton is produced in more than 12 states in India. The most cotton producing states in India are Madhya Pradesh, Maharashtra, Tamil Nadu, Karnataka, Punjab, Haryana, Gujarat and Rajasthan. Deep black soils of the Deccan and the Malwa Plateaus and those of Gujarat are favourable for cotton production. Tamil Nadu is one of the leading producers of cotton in the country. Tamil Nadu State is the tenth largest producer of cotton in the country. The cotton plants are grown in an area of about 70,000 hectares. In Namakkal district, cotton is cultivated predominantly as an

irrigated crop during (March-July). The cotton is also cultivated as a rainfed crop.

Impact of climate change on cotton production

Climate change impacts on cotton growth and development. Yield and fibre quality will most likely be a result of the net effects of: 1. Increased CO₂ concentration; 2. Reduced water availability and increased atmospheric evaporative demand as a result of lower rainfall and relative humidity; and 3. Increases in temperature. To overcome the adverse effects of climate change in cotton cultivation a lot of improved agricultural practices are suggested. However, farmers are facing a lot of obstacles in adopting those improved agricultural practices. In this study, an attempt was made to analyse the constraints perceived by the cotton cultivators in adopting the improved agricultural practices in cotton cultivation in mitigating the adverse effects of climate change (Sahu and Mishra, 2014; Uddin, *et al.*, 2017; Sakthivel and Kanagasabapathi, 2018).

Materials and Methods

The present study was conducted in Namakkal district of Tamil Nadu state. Out of the fifteen blocks in this district, higher population of cotton cultivators were noticed in Mallasamudram block. Hence, Mallasamudram block has been selected for the purpose of study. Mallasamudram block had twenty seven revenue villages and ten villages were purposively selected based upon its maximum number of cotton cultivators. For the selection of the respondents, proportionate random sampling technique was followed to select a sample size of one hundred and twenty respondents. For the purpose of data collection only the heads of households were contacted. The data were subjected to suitable statistical techniques like mean and percentage analysis and the results are tabulated for arriving at inferences.

Results and Discussion

The obstacles experienced by the respondents were ranked according to the number of respondents reported and the salient findings are presented in Table- 1

Table 1 : Obstacles perceived by the respondents in adopting the improved agricultural practices in cotton cultivation in mitigating the adverse effects of climate change. (n=120)

S.No.	Constraints	Number	Per cent	Rank
1	Pests and diseases attack	118	98.33	I
2	Failure of seasonal rainfall	117	97.50	II
3	Non availability of labour	112	93.33	III
4	High cost of labour	110	91.66	IV
5	High cost of inputs	107	89.13	V
6	Lack of suitable weed control measures	102	85.00	VI
7	Lack of remunerative price for the produce	98	81.66	VII
8	Poor information on early warning systems	89	72.50	VIII
9	Lack of good extension agency services	83	69.16	IX
10	Lack of information about climate change	82	68.33	X
11	Inadequate credit facilities	72	60.00	XI
12	Lack of access to weather forecast technologies	61	50.83	XII
13	Lack of training facilities	58	48.33	XIII
14	Non availability of farm machineries	52	43.33	XIV
15	Non availability of good quality seeds	47	39.16	XV

The data showed in Table 1, reveals the constraints perceived by the respondents in adopting the improved agricultural practices in cotton cultivation for mitigating the adverse effects of climate change.

'Pests and diseases attack' problem was expressed by 98.33 per cent of the respondents. Cotton crop was severely affected by pests like white fly, american bollworm, pink bollworm, aphids etc. and also it was affected by diseases like bacterial blight, boll rot and angular leaf spot etc. Most of the respondents faced heavy damage due to the incidence of pests and diseases in their cultivation. Because of this, farmers get lesser yield in their cultivation and also poor quality of the produce.

'Failure of seasonal rainfall' was expressed as a constraint by 97.50 per cent of the respondents. The farmers revealed that they depend mostly on seasonal rainfall for irrigation. But sometimes the rainfall fails in the season and hence led to unassured irrigation. This might have resulted in poor yield. This might be the possible reason for the reported

constraint. 'Non availability of labour' was expressed as a constraint by 93.33 per cent of the respondents. They reported that skilled labours were not available for carrying out such operations. Moreover, the agricultural labourers were demanding higher wages irrespective of the nature of work. Also, some of them would prefer to go for 100 days employment scheme implemented by the government as they could get higher wages with minimum work. Hence 'lack of availability of labourers' arose as the major problem.

'High cost of labour' was expressed as an economic constraint by 91.66 per cent of the respondents. The respondents felt that the increased wages for labours was an important aspect which increases the cost of production.

'High cost of inputs' was experienced as a constraint by 89.13 per cent of the respondents. This may be due to the fact that the price of inputs viz., cotton seeds, fertilizers, pesticides etc., was increased every year whereas the price of the produce has not increased proportionately. This would lead to high cost of production and less profit.

'Lack of suitable weed control measures' was the important constraint as expressed by 85.00 per cent of the respondents. Occurrence of heavy growth of weeds was mainly responsible for reduction in yield.

'Lack of remunerative price for the produce' was reported by 81.66 per cent of the respondents. There is a wide range of price fluctuation existed at market level. During peak harvest season the local merchants fix very low price due to maximum quantity of arrival at that time. Hence, the respondents would have considered this as a constraint in their cultivation.

'Poor information on early warning systems' and 'lack of access to weather forecast technologies' was reported by 72.50 per cent and 50.83 per cent of the respondents. Information problems may remain as serious challenges to farmers coping strategies as the farmers may not be aware of recent developments regarding climate change adaptations and the necessary readjustments needed.

'Lack of good extension agency services' was expressed as a constraint by 69.16 per cent of the cotton cultivators. The extension workers could not contact all the farmers personally in time. They were also pre-occupied with other official duties. This might be the reason for this constraint.

'Lack of information about climate change' was experienced as the constraint by 68.33 per cent of the respondents. No systematic effort was made by the officials of the state Department of Agriculture to disseminate the information about climate change and its impact on high yielding cotton crop at the village level.

'Inadequate credit facility' was reported by 60.00 per cent of the respondents. Lack of money hinders farmers in getting necessary resources and technologies which facilitated adaptation to climate change.

'Lack of training facilities' was reported by 48.33 per cent of the respondents. It was ascertained from the respondents that no systematic effort was taken by the concerned officials to give training to the farmers of remote areas regarding climate change.

'Non-availability of farm machineries' in time was reported by 43.33 per cent of the respondents. Some of the implements like tractor, sprayer and cotton decorticator are not available during peak season. If it is available cost per hour operation is more.

'Non availability of good quality seeds' was the constraint faced by 39.16 per cent of the respondents. Good quality seed is must for getting high yield in crop cultivation. The farmers reported that they could not get good quality seeds at Government depots and hence they had to use the seeds of their own field year after year which would have led to poor yield.

Conclusion

Based on the bottlenecks perceived by the cotton

cultivators in adopting the improved agricultural practices to mitigate the adverse effects of climate change the following suggestions are provided to overcome the constraints experienced by the farmers. 'Early warning' should be given to the farmers about environmental changes. Needed "Subsidies/compensation' may be given for the crops to make up the cost of cultivation. Due to weather aberrations, development departments should ensure supplying of production inputs at appropriate time in the villages and creating awareness about appropriate adaptations measures against climate change. Insurance needs to be extended to all crops. Support for adoption of organic farming technologies should be done. Support price can be given to all the crop produce based on cost of cultivation. Incentives/support for increasing the green manuring should be done. Financial support for soil nutrient enrichment can be done. These were the major suggestions offered by the farmers to mitigate the ill effects of climate change.

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