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Constraints faced by soybean growers in employing adaptation measures towards climate change

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Abstract

Climate change represents a significant threat to agriculture, greatly affecting crop yields and the livelihoods of farmers. This research was carried out in the Akola district of Maharashtra to evaluate the challenges encountered by soybean producers in adapting to climate change. A total of 150 participants were chosen through simple random sampling from ten villages. Data were gathered via structured interviews and analysed using percentage analysis. The results indicated that the primary challenges include a lack of precise weather forecast information (82.67%), limited technical knowledge regarding climate change (78.66%), reliance on monsoon rains (75.33%), and insufficient awareness of climate-resilient crop varieties (72%). Other concerns include inadequate institutional support, water scarcity, and a lack of extension training. Farmers recommended the establishment of local weather stations, the promotion of mobile applications in local languages, and the encouragement of climate-resilient varieties along with contract farming. Tackling these challenges through targeted interventions can greatly enhance farmers' ability to adapt to climate variability and ensure sustainable soybean production in the area. Keywords: Soybean, Climate change, Adaptation, constraints

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Introduction

Climate change is the one of the major issues the world is currently confronting in the twenty-first century. Changes in the mean or variability of the climate's qualities that last for a long time typically decades or longer can be used to identify long-term changes in the climate. The major environmental issue of climate change has an impact on agricultural production worldwide. The Akola district of Maharashtra is not exempted to the escalating average temperatures and unpredictable rains plaguing India. Perhaps the most urgent problem facing humanity is climate change. Because of lags in the climate system, climate stressors will persist to materialize despite massive mitigation measures (IPCC, 2007) [5]. Planning for adaptation aims to create and execute plans and policies that that aim to moderate or reduce harm associated with observed and projected climate hazards (IPCC, 2007) [5]. Climate change is expected to influence crop production, hydrological balance, input supplies and other components of agricultural systems. However, the nature of these bio-physical effects and human responses to them are complex and uncertain. Climate change and agriculture are interrelated processes. Due to its sensitivity, any change in the climate can have significant alterations in the crop yields (Rosezwerig and Parry 2007). The majority of farmers have difficulties when attempting to implement climate change adaptation measures. Long-term climate change is poorly understood, and there are no financial incentives for planting supplies. The increased cost of agricultural inputs and the low market price of products are the additional limitations. The study also suggested that weather forecast data be disseminated and made available in real time via social media (TV and radio) and agricultural extension workers to farmers. The goal should be to raise one's educational level to the point when vulnerability may be avoided (Suryawanshi, 2022) [4]. Considering this, a study on the assessment of constraints to the adaptation of coping mechanisms for climate change was carried out at the

farmer level to know the constraints faced by soybean growers while adaptation is assessed.

Materials and Methods

Maharashtra is a state with about most of the population depending on the agricultural sector for their livelihood. Climate variability and climate change have potential threats to the agriculture sector in Maharashtra state. The present study was undertaken in Akola district of Maharashtra out of eleven districts in Vidarbha region of Maharashtra State; Akola, district was purposively selected for the study. From, selected district, two tahsils were purposively selected *viz*. Akola and Barshitakli tahsils of Akola. These two tahsils were also selected based on area under the soybean cultivation. From each selected tahsils, 5 villages were selected for the present study from each tahsil. Thus, in all, 10 villages were selected for this study. From each selected village 15 respondents were selected for the present study who have been growing soybean crop for the last five years. Thus, in total 150 respondents were selected the for present study by using a simple random method. The selected respondents were interviewed personally with the help of pre-tested and well- structured interview schedule was used for collecting information on paddy cultivation. The collected data was analysed using the following statistical techniques; 1) percentage analysis with a well-structured and interview schedule. This study therefore identified the constraints encountered by the farmers in the selection of adaptation strategies in the study area.

Percentage analysis: It refers to a special kind of rates, percentages are used in making comparison between two or more series of data collected from the respondents. A percentage is used to show the relationship between the series.

Percentage = (No. of respondents/ Total No. of respondents) * 100

The Percentage was calculated to measure variables. Percentage analysis was used in descriptive analysis for making simple comparison.

Results and Discussion

The results obtained from the present investigation as well as relevant discussions have been summarized below.

Table 1: Distribution of respondents according to the constraints faced by soybean growers during adaptation of management practices towards climate change. (N=150)

Sr. No.	Constraints	Respondents (n=150)		
		Frequency	Percentage	Rank
1.	Lack of information about accurate weather forecasts.	124	82.67	1
2.	Inadequate knowledge about climate resilient crop varieties	108	72.00	4
3.	Lack of training on adaptation strategies by extension personnel	94	62.67	7
4.	Water shortage during critical growth period	103	68.66	5
5.	Fluctuation market in price of produce	89	59.33	9
6.	Lack of Institutional/governmental support	102	68.00	6
7	Lack of effective advisory system on climate change	93	62.00	8
8	Difficult to work in the field due to severe temperature	82	54.66	10
9	Low literacy level of soybean growers	67	44.66	12
10	Dependence on monsoon	113	75.33	3
11	Lack of technical know-how on climate change	118	78.66	2
12	Small size and fragmented landholding	78	52.00	11

From the table 1, it can be concluded that, majority of the soybean growers i.e., 82.67 per cent expressed that lack of information about accurate weather forecast is the major constraint in adapting management practices for climate change followed by lack of technical know-how on climate change is another constraint expressed by majority of the farmers i.e., 78.66 per cent, about (73.33%) soybean growers considered that dependence on monsoon is one of the major constraint,likewise, 72.00 per cent of growers said that Inadequate knowledge about climate resilient crop varieties is also a major constraint. 68.66 per cent growers believe that water shortage during critical growth period is one of the important problems to be addressed, other constraints faced by soybean growers, lack of Institutional/governmental support (68.00%), lack of training on adaptation by extension personnel (62.67%),lack of effective advisory system on climate change (62.00%), fluctuation in market price of produce (59.33%). About (54.66%), respondents expressed that it is difficult to work in the field due to severe temperature. Half of the respondents (50.00%) felt small size and fragmented landholding is a constraint for adapting new technologies for combating climate change. Less than half i.e., 44.66 per cent of soybean growers concluded that low literacy level of soybean growers is also a constraint in adaptation of management practices for combating climate change in soybean crop.

The results obtained from the present investigation as well as relevant discussions have been summarized below.

Table 2: Distribution of respondents according to the suggestions perceived by soybean growers during adaptation of management practices towards climate change. (N=150)

Sr. No.	Suggestions	Respondents (n=150)		
		Frequency	Percentage	Rank
1.	Establish local weather stations for easy accessibility of weather information	126	84.00	1
2.	Encourage the usage of mobile weather forecast apps in local languages.	108	72.00	2
3.	Increase drought management at the local level	102	68.00	4
4.	Adaptation of climate resilient soybean varieties	103	68.66	3
5.	Encourage contract farming arrangements with reasonable pricing criteria	89	59.33	6
6.	Introduce farmer-friendly smartphone apps that include voice navigation	94	62.67	5

From the table 2, it can be concluded that, majority of the soybean growers i.e., 82.00 per cent expressed that, establish local weather stations for easy accessibility of weather information is advisable, followed by encourage the usage of mobile weather forecast apps in local languages i.e., 72.00 per cent, about (68.66%) adaptation of climate resilient soybean varieties is suggested. 68.00 per cent growers suggested that, increase drought management at the local level. About (62.67%), respondents, introduce farmer-friendly smartphone apps that include voice navigation. More than half (59.33%), encourage contract farming arrangements with reasonable pricing criteria.

Conclusion

Our study underscores that the major constraint faced by soybean growers is lack of information about accurate weather forecasts and lack of technical know - how on climate change and other constraints like this dependence on monsoon and lack of training on adaptation strategies by extension personnel and some other major constraints like inadequate knowledge about climate resilient varieties, water shortage and lack of institutional support and difficulty to work in severe temperature and low literacy level of soybean growers is also expressed by some of the growers. Above constraints are need to be addressed by considering suggestions given by soybean growers is crucial enhances farmer readiness to combat the effects of climate change in the region.

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