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# Constraints encountered by Farmers in Adapting Climate Resilient Practices in Madhya Pradesh

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**ABSTRACT**

The paper focuses on the constraints experienced and suggestions proffered by farmers while adapting to climate resilient practices and technology in Bundelkhand and gird agro-climatic zones of Madhya Pradesh, India. There is need to adopt the new strategies to the farming system that helps to reduce the uncertainty in agriculture due to climate change. A sample of 235 respondents was interviewed to list the major constraints faced by farmers while adapting climate smart technology and strategies. The findings revealed that personal constraints like destruction of crops by erratic climatic events results in financial and mental instability of the farmers was the major constraints(mean=2.52). Lack of availability of inputs at village level (mean= 2.51) and lack of belief/credibility of weather information by weather forecasting systems (mean=2.28) were the major institutional and technological constraints faced by the farmers. In order to overcome these constraints so as to enhance the capability of farmers several suggestions were made by farmers. Weather forecasting and delivering of information should be more accurate and timely followed by more and frequent visits of extension agents should be there to help and assist farmers on climate resilient technology and there should be proper assessment of crop damage and compensation should be timely deliver to the farmers were the major suggestions given by the farmers.

**Keywords:** Constraints, climate change, resilient practices.

## INTRODUCTION

Madhya Pradesh (MP) is a state in central India. Uttar Pradesh, Chhattisgarh, Maharashtra, Gujarat, and Rajasthan are its neighbours to the north, east, south, and west, respectively. Madhya Pradesh experiences a hot, dry subtropical climate. The monsoon season (June–September) follows the summer (April–June) season. Madhya Pradesh experiences a cool, dry winter. Due to the migration of moisture from east to west, Madhya Pradesh experiences higher rainfall on average each year—roughly

1300 mm—in the eastern than in the western parts of the state. In MP, there is a lot of spatial variation in rainfall. For instance, districts in the south-west get around 2100 mm more rain than areas in the north-west, which only get about 1000 mm. A little over 12% of India's total land area is covered in forests, or roughly 31% of the MP. In MP, one of the most significant industries is agriculture. The majority of the population—roughly 75%—lives in rural areas where they are either actively or indirectly involved in agricultural activities. As a result, agriculture is crucial to the economy and socioeconomic situation in MP. The gross cropped area of MP is 20,000 ha, compared to the net sown area of roughly 15,000 ha. Double crops are grown on roughly 5000 ha of land, and irrigation is used on about 5500 ha. The following are the main crops farmed in MP: cotton, rice, wheat, jwar, gram, soybean, and sugarcane. Temperature and rainfall measurements show the effects of climate fluctuation and change. For instance, the 20th century saw an increase in both global and regional air temperatures, with the last 30 years seeing the greatest warming [WMO, 2005]. Additionally, 2014 was noted as being the warmest year in the record that has measurements available. Agriculture may suffer as a result of the shrinking temperature differential between the maximum and minimum [Easterling et al., 1997]. Climate variables, such as precipitation and air temperature, have also seen notable changes throughout India between 1950 and 2008 [Mishra et al., 2014a, 2014b]. According to Mishra et al. (2012), decreasing trends in the recorded precipitation during the monsoon season were noted, and these changes were partly attributed to the warming of the Indian Ocean [Alory et al., 2007; Brown and Funk, 2008]. According to Karl et al. (1996), there has been an increase in mean air temperature worldwide, which is similar with patterns seen in India (Kumar et al., 1994). Regionally, Mishra et al. [2014] found that over much of India, precipitation decreased as temperature increased over the past several decades, leading to an increase in the frequency of droughts and a decrease in soil moisture for agricultural development.

India is aagro-based country and agriculture is highly dependent on climate. While in the era of facing the issues related to climate change in agriculture, adaptive capacity of farmers brings ability to adjust to climate change (including climate variability and other weather extremes) and to moderate potential damages. Keeping all these in vies, the present study was conducted with the objective to study the constraints faced by the farmers and to rank them accordingly in adapting the climate resilient technologies.

## METHODOLOGY

The study was conducted in five climatic vulnerable districts of two agro-climatic zones of Madhya Pradesh during the year 2022-23 i.e. Bundelkhand and Gird agro-climatic zone. These districts were Datia, Chhatarpur, Tikamgarh, Morena and Guna. By using proportionate random sampling 10 per cent of the total beneficiary farmers were selected from each district on the basis of the list of beneficiary farmers obtained from the KVK of each district constitute a total sample size of 235 farmers. An open-ended structured interview and focused group discussion was carried out to obtain the results. Data from the study were analyzed using the descriptive statistics, frequency, percentage and mean score.

## RESULT AND DISCUSSION

Farmers are practicing different climate resilient practices to cope up with the adverse effect of changing climate. While doing so, they face many challenges and problems in their field and these

constraints faced by farmers were categorized into personal, institutional and technical constraints. The findings of the study were furnished in table 1.

**Table.1. Distribution of respondents according to the constraint faced by them in adaptation to climate change**

**N=235**

| S.NO | Particulars | More severe | Sever | Less sever | Mean | Rank |
|---|---|---|---|---|---|---|
| | | **F** | **F** | **F** | | |
| **PERSONAL CONSTRAINTS** | | | | | | |
| **I** | Facing social and cultural barriers that make it challenging to adopt climate smart agriculture practices. | 68 (28.94) | 74 (31.49) | 93 (39.57) | 1.89 | VII |
| **II** | Unavailability of labours. | 112 (47.66) | 69 (29.36) | 54 (22.98) | 2.25 | III |
| **III** | Lack of information about climate change. | 80 (34.04) | 96 (40.85) | 59 (25.11) | 2.09 | V |
| **IV** | Small size or fragmented land holdings. | 110 (46.81) | 94 (40.00) | 31 (13.19) | 2.34 | II |
| **V** | Low literacy level. | 76 (32.34) | 86 (36.60) | 73 (31.06) | 2.01 | VI |
| **VI** | Fear of 'what will be the consequences of climate resilient technologies and adaptation strategies. | 110 (46.81) | 59 (25.11) | 66 (28.09) | 2.19 | IV |
| **VII** | Destruction of crops by erratic climatic events results in financial and mental instability. | 159 (67.66) | 40 (17.02) | 36 (15.32) | 2.52 | I |
| **INSTITUTIONAL CONSTRAINTS** | | | | | | |
| **I** | Lack of support from government agencies regarding funding or technical assistance. | 149 (63.40) | 50 (21.28) | 36 (15.32) | 2.48 | II |
| **II** | Limited access to farm machineries from custom hiring centers.(untimely) | 119 (50.64) | 56 (23.83) | 60 (25.53) | 2.25 | V |
| **III** | High cost of improved seed varieties. | 85 (36.17) | 96 (40.85) | 54 (22.98) | 2.13 | VII |
| **IV** | Dissatisfied with both the level of compensation and delays in settlement of crop insurance. | 125 (53.19) | 74 (31.49) | 36 (15.32) | 2.38 | III |
| **V** | Absence of adequate processing and storage facilities at village level. | 96 (40.85) | 116 (49.36) | 23 (9.79) | 2.31 | IV |
| **VI** | Lack of consistent support from extension agencies on climate risk management. | 135 (57.45) | 38 (16.17) | 62 (26.38) | 2.31 | |
| **VII** | Lack of availability of inputs at village level. (Timely) | 156 (66.38) | 44 (18.72) | 35 (14.89) | 2.51 | I |
| **VIII** | Difficulty in getting loans/credit from banks due to more paper work. | 110 (46.81) | 62 (26.38) | 63 (26.81) | 2.20 | VI |

| | | | | | | |
|---|---|---|---|---|---|---|
| **TECHNOLOGICAL CONSTRAINTS** | | | | | | |
| **I** | Practicing climate smart-agriculture involves purchasing of new implements and training requirements. | 69 (29.36) | 116 (49.63) | 50 (21.28) | 2.08 | VI |
| **II** | It is difficult to transition towards climate-smart practices from traditional farm practices. | 65 (27.66) | 135 (57.45) | 35 (14.89) | 2.13 | IV |
| **III** | Lack of knowledge regarding implementation of climate-smart practices on field. | 62 (26.38) | 126 (53.62) | 47 (20.00) | 2.06 | VII |
| **IV** | Lack of know-how knowledge about improved farm practices. | 97 (41.28) | 88 (37.45) | 50 (21.28) | 2.20 | III |
| **V** | Lack of belief/credibility of weather information by weather forecasting system. | 77 (32.77) | 147 (62.55) | 11 (4.68) | 2.28 | I |
| **VI** | Difficulty in shifting to different cropping pattern in short duration of crops. | 61 (25.96) | 139 (59.15) | 35 (14.89) | 2.11 | V |
| **VII** | Climate-smart technologies and practices involves higher investments(Cost prohibitive) | 88 (37.45) | 116 (49.36) | 31 (13.19) | 2.24 | II |

**F= frequency P= percentage**

**Personal constraints faced by farmers –**

The major constraints faced by the farmers related to the adaptation of climate resilient technologies on personal level were 'Destruction of crops by erratic climatic events results in financial and mental instability of the farmers' which ranks I, followed by small size (II), fragmented land holdings and unavailability of labours (III), fear of what will be the consequence of climate resilient technologies and adaptation strategies(IV), lack of information about climate change (V), low literacy level (VI) and facing social and cultural barriers that make it challenging to adopt climate smart agricultural practices(VII), respectively.Satishkumarel al. (2013) founded in their study that 60 per cent of the farmers had small landholding (due to nuclear family or small annual income) and 56 per cent of the farmers were having low literacy level which were the major constraint to adapt various coping measures like soil and water conservation measures, practicing diversified farming, cultivating drought resistant varieties etc.Nzeadibe et al (2011) revealed in their study that the major factors hindering adaptation to climate change was mainly inadequate information, limited awareness and knowledge in regard to adaptation strategies. Platt et al. (2020) noticed that many respondents felt that they would not be able to adapt due to scarcity of resources and a lack of trust in different organizations. The study further reported that, a collective belief might shape the entire community's attitude and willingness to adapt despite perceiving climate change. In addition to this, some studies also mentioned that social and cultural barriers like gender, education, age, and caste could influence adaptive capacity of the farmers. In India, gender and caste are still prevalent in such a way that they can create different modes of discrimination and privilege in adopting adaptation actions (Sam et al., 2020)

**Institutional constraints faced by farmers –**

Regarding the institutional constraints faced by the farmers while adapting climate resilient strategies it was observed that , most of the farmers experienced lack of availability of inputs at village level which ranked I, followed by lack of support from government agencies regarding funding or

technical assistance(II), dissatisfied with both the level of compensation and delay in settlement of crop insurance(III), absence of adequate processing and storage facilities at village level and lack of consistent support from extension agencies on climate risk management(IV),untimely and limited access to farm machineries from custom hiring centers(V), Difficulty in getting loans/credit from banks due to more paper work(VI) and high cost of improved seed varieties ranked VII, respectively.Dupdal and Patil (2019) revealed in their study that farmer's poor adaptation to climate change is due to the lack of timely available inputs, lack of credit and insurance services, limited access to agricultural extension services and low or no subsidies on desired agricultural inputs. On the other hand, farmers, Funk et al (2020) revealed that farmer who maintain frequent contact with agricultural extension officers and have accessibility to credit (Swami and Parthasarathy (2020) can make efficient adaptations. Datta et. al (2022) found that lack of quality seeds, lack of storage facility, lack of accessibility to improved technology, credit accessibility was some of the major factors that influencing the adoption of adaptation actions by the farmers.

**Technical constraints faced by farmers –**

Technical constraints reported by the farmers were, lack of belief/credibility of weather information by weather forecasting systems, which ranked I followed by Climate-smart technologies and practices involves higher investments(Cost prohibitive) (II), Lack of know-how knowledge about improved farm practices (III), It is difficult to transition towards climate-smart practices from traditional farm practices (IV), Difficulty in shifting to different cropping pattern in short duration of crops (V),Lack of knowledge regarding implementation of climate-smart practices on field. (VI) and Practicing climate smart-agriculture involves purchasing of new implements and training requirements ranked VII, respectively. The results are consistent with earlier research by Ravi Shankar et al. (2011) and Idrsi et al. (2012), which found that farmers' main complaints revolved around the lack of location-specific climate forecasts, poor reliability, and failure of the forecasts, as well as poor extension services on climate prediction, media forecasts that failed to address practical needs, and low confidence in climate prediction. Satishkumarel al. (2013) in their study on farmers adapting to climate change in rainfed agriculture found that about 66% of farmers opined that lack of access to information on weather forecasting technology and poor reliability on it were the major obstacles to practice adaptability measures to prevent conditions of change in climate. Furthermore, the study concluded that 46% of respondent farmers stated that they were facing constraints in creating irrigation facilities. This was due to the fact that high cost involved in constructing the rain water harvesting structures and for other utilities like micro irrigation structures, (42%) expressed that sudden shift in the cropping pattern in a short duration of time due to climate vulnerabilities is very difficult and 40% of the farmers lack the technical knowledge on climate change, its consequences and adaptation strategies thereof was the major constraint faced by the affected farmers.

Fig1. Personal constraints faced by farmers while adapting strategies to mitigate climate change.

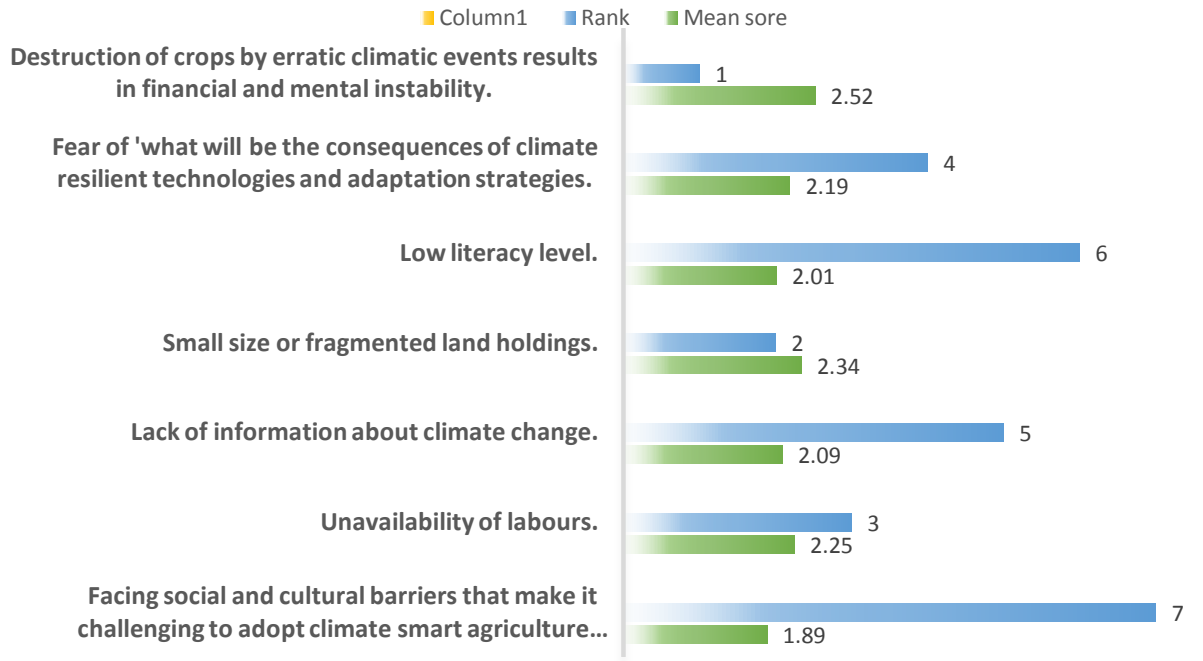
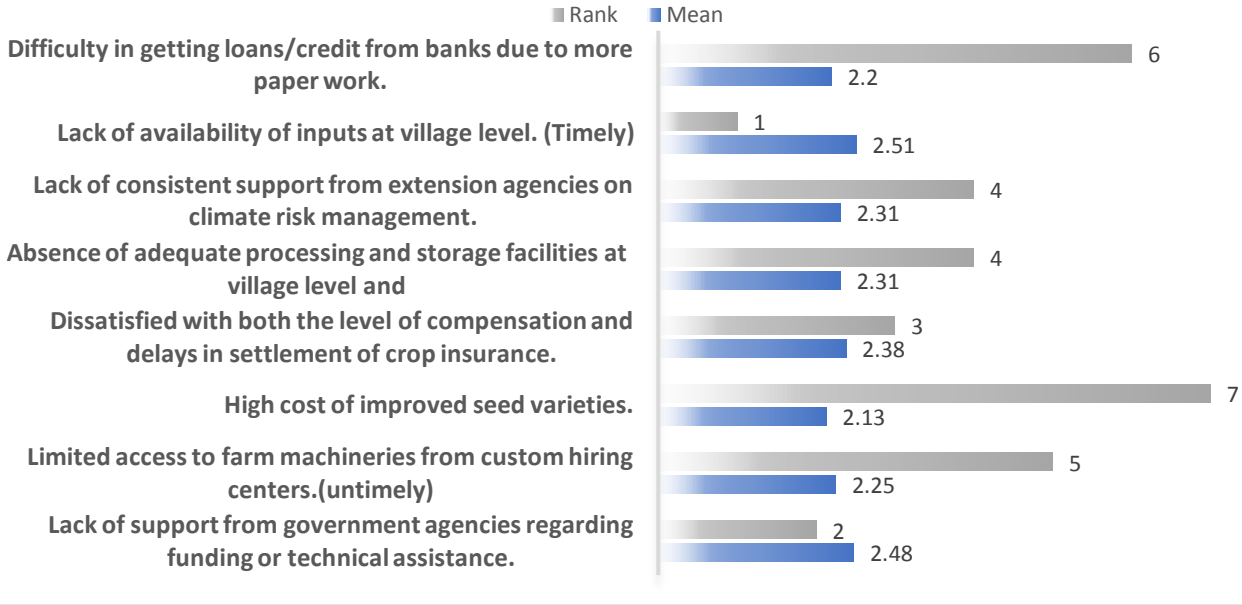



Fig2. Institutional constrainst by farmers while adapting strategies to mitigate climate change.



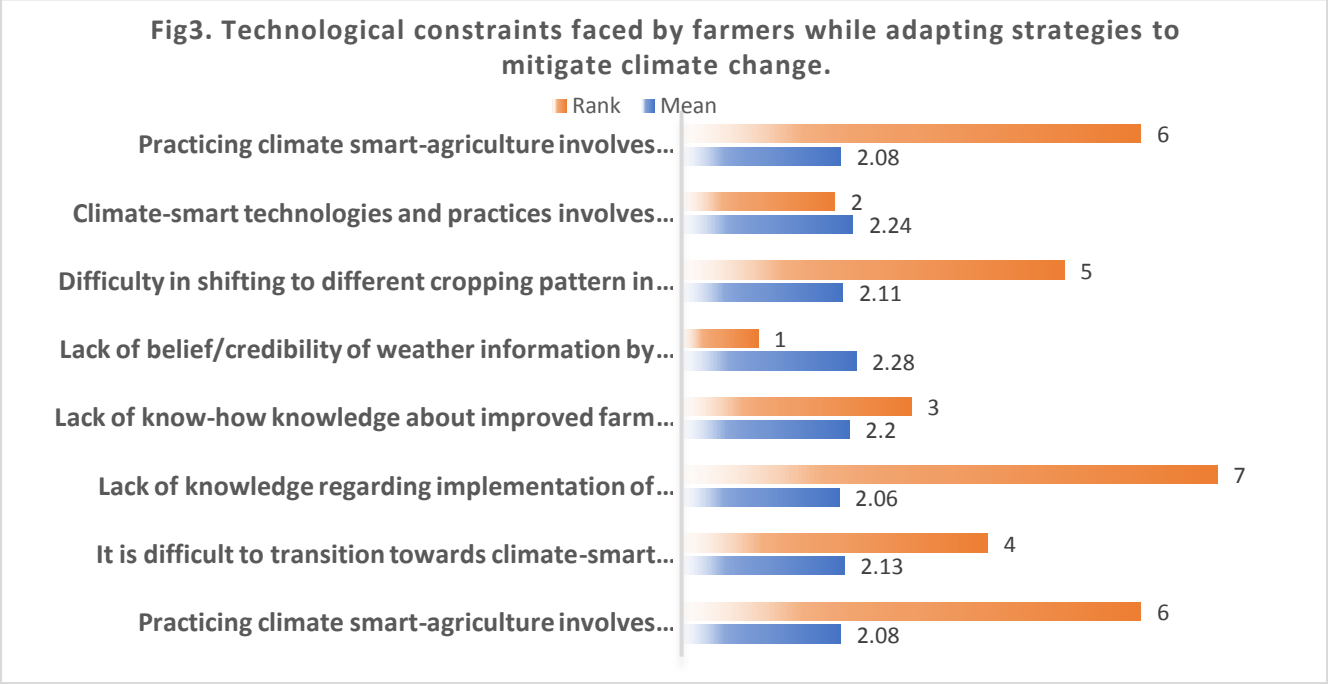



**Table.2. Distribution of respondents according to their suggestions to minimize the constraints in adaptation to climate change**

| S.NO | SUGGESTIONS | F | P |
|---|---|---|---|
| I | Weather forecasting and delivering of information should be more accurate and timely. | 205 | 87.23 |
| II | There should be proper assessment of crop damage and compensation should be timely deliver to the farmers. | 178 | 75.74 |
| III | Government should built more water harvesting infrastructure to reduce scarcity of irrigation water. | 163 | 69.36 |
| IV | MSP for crops is to be issue according to the cost of cultivation of particular crop. | 160 | 68.09 |
| V | Early warnings is to be issued in case of adverse weather conditions. | 143 | 60.85 |
| VI | More and frequent visits of extension agents should be there to help and assist farmers on climate resilient technology | 180 | 76.60 |
| VII | Government should ensure availability of inputs near to village throughout the year. | 129 | 54.89 |
| VIII | Ensure availability of farm machineries at custom hiring centers. | 154 | 65.53 |
| IX | Regular awareness camps to be arranged for better awareness regarding climate change . | 120 | 51.06 |
| X | There is need to increase the coverage of training programs which enumerates more number of farmers so that majority of the farmers can get exposure to climate resilient technologies and practices. | 96 | 40.85 |

**F= frequency P= percentage**

**Suggestions made by the farmers to overcome these constraints-**

Farmers were facing many constraints as listed above while adapting the climate resilient strategies to their farms and to resolve these constraints farmers have offered suggestions. The valuable suggestions given by farmers in order to overcome the adverse effects of climate change and in favor of adapting improved practices were furnished in table 2. The results revealed that majority of the farmers (87.23%) were suggested, weather forecasting and delivering of information should be more accurately and timely given followed by 76.60 per cent of the farmers said that there should be more and frequent visits of the extension personnel to help and assist farmers on climate resilient related technologies and practices. Similarly, 75.74 per cent of the farmers proposed that there should be proper assessment of crop damages and compensation should be timely delivered to the farmers to avoid any financial crises. Moreover, 69.36 per cent of the farmers submitted their suggestion as government should build more water harvesting infrastructure to reduce scarcity of irrigation water during the rabi crops. Also, 68.09 per cent and 65.53 per cent of the farmers suggested that MSP for crops is to be issue according to the cost of cultivation of particular crop and availability of farm machineries at custom hiring centers should be ensured. Furthermore ,60.85 per cent of the farmers proposed that early warnings are to be issued in case of adverse weather conditions whereas 54.89 per cent said that government should ensure availability of inputs near to village throughout the year. About 51.06 per cent of the farmer's recommended that regular awareness camps to be arranged for better awareness regarding climate change and 40.85 per cent propounded that there is need to increase the coverage of training programs which enumerates more number of farmers so that majority of the farmers can get exposure to climate resilient technologies and practices, respectively.

## CONCLUSION

In conclusion, farmers practice different adaptability measures to overcome and prevent the effect of climate change in the agriculture. However, farmers come across varieties of constraints in adaptation in response to climate change. The constraints may be personal, institutional and even technological with respect to climate change adaptation process. The major constraints faced by sample farmers in the region were 'Destruction of crops by erratic climatic events results in financial and mental instability of the farmers, small size and fragmented land holdings and unavailability of labours, lack of availability of inputs at village level, lack of support from government agencies regarding funding or technical assistance, dissatisfied with both the level of compensation and delay in settlement of crop insurance, lack of belief/credibility of weather information by weather forecasting systems, Climate-smart technologies and practices involves higher investments, Lack of know-how knowledge about improved farm practices. Farmers have also suggested important suggestion for minimizing the constraints in adaptation to climate change. Some of suggestions are weather forecast need to be more accurate and available in time, Government support to farmers during natural calamities and timely supply of farm inputs on subsidized rate and proper assessment of crop damages and compensation should be timely delivered to the farmers to avoid any financial crises. Therefore, it is advisable that policy of reliable and effective measures of adaptation need to be implemented and must be accessible to the end users. The government support and measures towards various adaptation strategies in reducing the constraints in adaptation is necessary so that farmers could cope up with changing climatic variability.

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