

Challenges Faced by Cotton Farmers in Adapting to Climate Variability and Proposed Solutions

L. Mahesh¹; R. D. Ahire²; P. R. Deshmukh³; R. P. Kadam⁴ and B. V. Asewar⁵

Department of Extension Education College of Agriculture, Parbhani, VNMKV, Parbhani -431402

Abstract:- This study was carried out in Telangana's Adilabad and Mahabubnagar districts, where 240 farmers were sampled using an ex-post facto research design. Among the challenges faced, price fluctuations were the most significant, with 95.83% of farmers identifying this issue. This was attributed to the absence of a guaranteed minimum support price, which hampers farmers' income and limits their ability to purchase the inputs required for adapting to climate change. To address this, the majority (91.66%) suggested the government implement a minimum support price. Another prevalent issue was the need for drought-resistant crop varieties, noted by 87.50% of farmers.

I. INTRODUCTION

Climate variability is expected to increase the frequency of droughts in districts such as Adilabad and Mahabubnagar, which could significantly impact water resources and other related sectors. Prolonged droughts not only threaten agricultural livelihoods but also increase the vulnerability of farmers and others who rely on these systems. Farmers heavily dependent on rain-fed agriculture face food insecurity due to crop failure during droughts. Additionally, for those who depend on livestock, drought can lead to malnutrition or illness in animals due to the lack of sufficient fodder. This research focuses on how these communities adapt to and manage climate variability, based on personal interviews to assess the impact and coping mechanisms, as well as the factors that contribute to resilience.

While various adaptation and mitigation strategies have been introduced by both government and private agencies, there is limited research on how prepared farmers are to adopt

these practices in response to climate change. To fill this gap, this study aims to investigate cotton growers' perceptions and adaptive measures regarding climate variability in Telangana, specifically in the districts of Adilabad and Mahabubnagar.

II. METHODOLOGY

This study adopted an ex-post facto research design as defined by Kerlinger (1973), where the researchers did not have direct control over the influencing variables since they had already occurred. Telangana was chosen for the study due to the projected increase in drought occurrences in districts like Adilabad and Mahabubnagar, which affects water resources and has a cascading impact on other sectors. Farmers in these districts, who depend heavily on rainfall for their agricultural activities, face food insecurity when crops fail due to drought. The study sampled 240 farmers from 12 villages across two Mandals from each district, with 20 farmers selected per village.

➤ Constraints Faced by Farmers in Adapting to Climate Variability:

The constraints expressed by the cotton growers regarding their ability to adapt to climate variability are presented in Table 1. The majority of farmers (95.83%) cited price fluctuations in the market as the biggest challenge, primarily due to the lack of a government-fixed minimum support price. This price instability affects their income and limits their ability to invest in necessary farm inputs for adapting to changing climatic conditions. The second most commonly reported issue was the unavailability of crop varieties that can withstand terminal drought, as noted by 94.16% of respondents. This may be attributed to the limited research on developing drought-resistant varieties.

Table 1 Constraints faced by the farmers in adaptability towards the Climate Variability.

Sr. No	Constraints	Frequency	Percentage	Rank
1	Price fluctuations in the market after crop production	230	95.83	I
2	Non-availability of short-duration varieties suitable for escaping the terminal drought	226	94.16	II
3	High incidence of diseases and pests	220	91.66	III
4	Lack of effective advisory system on changes in climate	216	90.00	IV
5	Requirement of money ahead of season for preparedness	210	87.50	V
6	Frequent interruptions in power supply	204	85.00	VI
7	Lack of awareness of pest and disease-tolerant varieties	200	83.33	VII
8	Higher cost of cultivation using scientific methods	190	79.16	VIII
9	Lack of information of adaption options to face climate variability	186	81.66	IX
10	Absence of suitable rainwater harvesting structures	184	76.66	X

11	Non- Non-availability of credit and subsidy facilities in the locality	172	73.33	XI
12	Lack of information about weather and climate	164	68.33	XII
13	Lack of efficient market facilities at the village level	162	67.50	XIII
14	Lack of proper storage	156	65.00	XIV

Additionally, 91.66% of farmers pointed to the high incidence of pests and diseases as a major challenge, and 90.00% noted the lack of a reliable advisory system on climate change. Financial constraints were also significant, with 87.50% of respondents indicating the need for money in advance of the planting season to prepare for climatic changes. Other issues included frequent power interruptions (85.00%), a lack of awareness about pest- and disease-tolerant crop varieties (83.33%), and high costs associated with scientific farming methods (79.16%).

Many farmers (81.66%) also expressed concern over the lack of information on options to adapt to climate variability, while 76.66% pointed to the absence of rainwater harvesting structures. Credit and subsidy facilities, available only to

73.33% of the respondents, were also cited as important for enabling adaptation efforts. Additionally, 68.33% highlighted the lack of information on weather and climate, which is crucial for effective climate adaptation.

➤ *Suggestions to Overcome the Challenges (Revised):*

Farmers also provided a number of suggestions for overcoming these challenges. The most commonly suggested solution (91.66%) was the introduction of a minimum support price by the government to stabilize market prices. Additionally, 87.50% of respondents advocated for the development of drought-resistant crop varieties, particularly for groundnut, red gram, and cotton, which are also resistant to pests and diseases.

Table 2 Suggestions Elicited by the Farmers on Climate Variability

Sr. No	Suggestion	Frequency	Percentage	Rank
1.	A contingency plan may be worked out by the researchers to minimize the effect of drought	192	80.00	VII
2.	More awareness may be created among the farming community on available varieties that can be tolerant to pests and diseases.	204	87.50	IV
3.	Extension officials may consider polambadi programme as a platform to enlighten the farmers on the importance of controlling the pest and disease	176	73.33	X
4.	The officials of Department of agriculture, gear up the effort to disseminate available practices among the farming community which can enhance their capacity to withstand the aberrations in climate	160	66.66	XIII
5.	Provision of an effective advisory system and to counsel the farmers on various issues about climate variability and measures to overcome them.	186	77.50	VIII
6.	Fixing of minimum support price by the government	220	91.66	I
7.	Weather and climate information should be made available up to the farmer's village level	190	79.16	VII
8.	Arrangement for the availability of credit and subsidy by the government	196	81.66	V
9.	The government should ensure public warehousing facility to place the produce produced by the farmers and this facility may be arranged within the vicinity of the farmer's villages	158	65.83	XIII
10.	The establishment of rainwater harvesting structures at individual farms may enhance the water table in the ground	170	70.83	XII
11.	Contingency plans may be designed with various kinds of models of cropping patterns and cropping systems to address repetitive extreme weather conditions	150	62.50	XIV
12.	Seven hours of continuous and uninterrupted power may be supplied to irrigate crops for better crop production	180	75.00	XI
13.	Training may be given to farmers and extension officials on techniques of crop production and adaptation options to address various issues in climate Variability	200	83.33	III
14.	Evolving varieties that can escape the terminal drought in cotton and are resistant to pests and diseases	210	87.50	II

Other recommendations included increasing awareness among the farming community about pest- and disease-resistant varieties (87.50%), providing training for farmers and extension officers on crop production and climate adaptation techniques (83.33%), and making credit and subsidies more accessible (81.66%). Farmers also suggested that researchers develop contingency plans to mitigate the effects of drought (80.00%) and ensure that weather and climate information is available at the village level (79.16%).

To improve water availability, 70.83% of farmers proposed the construction of rainwater harvesting structures at individual farms. In addition, 75.00% of respondents suggested the provision of continuous and uninterrupted power for crop irrigation.

III. CONCLUSIONS

The findings of the study highlight that price fluctuations in the market were identified as the most pressing issue for farmers, with 95.83% of respondents ranking it as the top constraint. This can be linked to the absence of a government-mandated minimum support price, which negatively affects farmers' earnings and restricts their ability to purchase essential farm inputs needed to adapt to climate change. Most farmers (91.66%) recommended that the government should introduce a minimum support price to stabilize market conditions.

Additionally, 87.50% of respondents suggested the development of crop varieties that can withstand terminal drought and are resistant to pests and diseases, which would significantly improve their capacity to cope with climate variability. Based on these results, it is clear that implementing a minimum support price and encouraging the development of drought-resistant, pest-resistant varieties are crucial measures to support farmers in adapting to climate challenges.

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