



Constraints in Adoption of Climate Resilient Agricultural Technologies in Telangana

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ABSTRACT

The two major agrarian challenges of the modern era are climate change and food security. Unquestionably the best way to address these issues is adaptation through climate resilience. Making the nation's most susceptible areas climate resilient is the goal of the ICAR effort known as "National Innovations in Climate Resilient Agriculture" (NICRA). Since the inception of the project, several climate resilient technologies have been demonstrated across the country. The investigation was undertaken to isolate the constraints in the adoption of these technologies in Telangana state using a sample size of 200 respondents from four villages in two districts. The findings of Garrett ranking analysis revealed that more interest to follow conventional practices, inadequate institutional financial support, inadequate services through CHCs and insufficient effort on the part of the officials to provide services to all farmers during the busiest season were the predominant constraints to the adoption of climate resilient agricultural technologies by farmers.

INTRODUCTION

Climate change is affecting agricultural sector in India (Vijayabhinandana et al., 2022). Climate change and extreme hazards like floods and severe droughts lead to substantial crop losses, volatility of food prices, and livelihood insecurity (Ghanghas et al., 2015; Meena et al., 2022). Climate change has a variety of effects on agriculture, including decreased crop productivity, incidence of pest and diseases and change in cropping pattern (Ashoka et al., 2022). Climate change has also become a global issue requiring attention and action because to increasing temperatures, extensive glacier melt, variations in the increased frequency of catastrophic events, and more (Pabba et al., 2022). Due to rising in temperature, agriculture production is expected to decline by 2050 in Himalaya region and will lead food insecurity (Bharat et al., 2022). It is set to compound the daunting complex challenges already being faced by agriculture. The phenomenon of climate change is often less understood and more experienced, especially in rural communities (Babu, 2019). In particular, People in rural areas are highly

vulnerable to climate change because residents there rely so heavily on natural resources like agricultural land and nearby water supplies. (Pravallika & Mazhar, 2021). Indian agriculture is particularly sensitive to climate change and variability and it a changing climatic and economic environment, faces the simultaneous problem of feeding a billion people. (Kirwa et al., 2020). Practices that enhance-resilience by reducing vulnerability could be the best adaptation options available for climate change. Because of this, the nodal agency, the ICAR introduced a significant network project in February 2011 i.e., National Initiative on Climate Resilient Agriculture recently changed as National Innovations in Climate Resilient Agriculture (NICRA). It aims to promote Climate Resilient Agricultural (CRA) technologies to enhance the resilience of Indian agriculture (Pabba et al., 2021).

In this context, it is essential to ensure that the interventions of NICRA are in full use by the farmers at the grass-root level. Various studies have shown that the farmers' decision of non-adoption or partial adoption could be rational due to the existing conditions that restrain adoption (Rodriguez, 2005). Lack of

knowledge about cultivation practices, lack of availability of seeds in the market, resistance to change the conventional practices, lack of adequate information on CRA technologies and weather status to plan their farming activities, and high cost for construction of well or farm pond were some of the constraints faced by the NICRA beneficiaries (Jasna, 2014; Ravikumar et al., 2015; Nyasimi., 2017; Mohokar, 2019;). Farmers' are facing several constraints while adopting climate resilient technologies to the fullest. With the help of proper planning, suitable strategies, and efficient utilization of available resources it is possible to overcome the constraints (Shelar et al., 2022). The implementing agencies need to prevent such obstacles encountered by the farmers to enable full scale adoption of the technologies both in the short run and long run. The purpose of the current study was to analyze the factors constraining the adoption of CRA technologies.

METHODOLOGY

The study was carried out in Telangana's Suryapet and Khammam districts, which were purposively chosen. The NICRA has been implemented in these districts since it was first introduced, hence the research locations were chosen purposively. The locations for the study were susceptible to climatic change. As the project has only been carried out in these villages of the respective state, Boring Thanda, Kotha Thanda, and Nandyalagudem are the three villages of Suryapet district and Nacharam village of Khammam district, were purposefully chosen. The study used an ex-post facto research design because the manifestations of the variables was presumed to have already happened and additional manipulation was not possible. To analyze the constraints faced in the adoption of CRA technologies being promoted under the NICRA project, a sample of 50 respondents were chosen randomly from every village, making a total of 200 respondents. With the aid of a systematic interview schedule, primary data was gathered.

With the help of Henry Garrett's Ranking Technique, rankings given by respondents were evaluated. When respondents were

asked to rank the specified constraints, the results of their ranking were converted into score values with the help of the following formula suggested by (Garrett, 1979).

$$\text{Percent position} = \frac{100 (\text{Rij} - 0.5)}{\text{Nj}}$$

Where, Rij = Rank given for the i^{th} variable by j^{th} respondents, Nj = Number of variables ranked by j^{th} respondents

With the help of Garrett's Table, scores were created using the predicted percent position. The scores of each individual were then totaled for each constraint element, and the sum of the scores as well as the mean values of the scores were determined. It was decided that the constraint factor with the highest mean value was the most important one.

RESULTS AND DISCUSSION

Constraints faced by the farmers in adopting CRA technologies

The major constraints elicited by the farmer's in the selected NICRA villages under socio-personal constraints were more interested to follow conventional practices as they did not want to take any new risks and follow the same old conventional practices followed by the constraint inability to accept new practices because out of fear that the farming in drought conditions is unpredictable which ranked second. Increasing labor scarcity is one of the major constraints in agriculture because most of the available labor was participating in the government programs like MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act) and younger generations in villages were interested in activities other than agriculture ranked third. Whereas inability to take the risk and small size of the farm ranked fourth and fifth respectively by the farmers in adopting climate resilient agricultural technologies as the land is getting fragmented over the generations, the small size of the farm was also opined as a constraint. Results are presented in Table 1.

Table 1. Constraints faced by the farmers in adopting CRA technologies

S.No. Constraints	Garrett mean score	Ranks
Socio-Personal		
1 Inability to take risks	51.78	IV
2 Inability to accept new practices	61.48	II
3 Small size of the farm	23.09	V
4 More interested to follow conventional practices	66.46	I
5 Increasing labour scarcity	59.60	III
Financial constraints		
1 High cost of inputs	41.67	IV
2 Higher investment cost on farm implements	45.33	III
3 Inadequate institutional financial support	78	I
4 Lack of market access	31.33	V
5 Lack of savings	50.67	II
Technological constraints		
1 Lack of awareness about climate change	30.67	IV
2 Lack of timely information related to CRA technologies	42.67	III
3 lack of timely availability of improved seed	38.33	II
4 Inadequate services through CHCs	59.67	I
Others/ Situational constraints		
1 Poor information accessibility and utilization of weather based agro advisory services	58.72	II
2 Lack of support from line departments	36.85	IV
3 Inability of the officials to provide services to all farmers during the peak period	65.40	I
4 Insufficient need based trainings on CRA technologies	45.41	III

Among the major constraints faced by the farmer's under financial constraints. Inadequate institutional financial support was ranked first as agriculture operations are time bound, farmers have expressed the difficulty of non-availability of timely financial support due to which they could not purchase the seed, fertilizer, and other inputs in time and so this was viewed as an important constraint. It was followed by a lack of savings as most of the income generated by the farmers in the study area was through agriculture which was sufficient to meet their livelihood and very less was left out for savings and to meet the unforeseen expenditure. Higher investment cost on farm implements was ranked third because to perform various agricultural operations right from sowing to harvesting, farm implements suitable for dry land like rotavator, planters, seed cum ferti drill, crop threshers are expensive and it is difficult to provide subsidy to all the farmers. The high cost of inputs which ranked fourth, the ever-increasing cost of the inputs such as seed, fertilizers, and plant protection chemicals was also a major constraint faced by the farmers restraining them from adopting climate resilient technologies, and lack of market access was ranked fifth among financial constraints faced by the farmers

Under the domain of technological constraints, inadequate services through CHCs were ranked first by the majority of the farmer's because services offered through Custom Hiring Centre's are not adequate to meet the needs of the farmer's at the village level. Lack of timely availability of improved seed was ranked second as a major constraint may be due to the shortage in availability of quality inputs, traders sell the inputs at high cost resulting in non-adoption of input-intensive CRA technologies. Lack of timely information related to CRA technologies and lack of awareness about climate change were ranked fourth and fifth major constraints faced by the farmers among technological constraints while adopting climate resilient technologies. Among the major constraints faced by the farmer's under the others/situational constraints, Inability of the officials to provide services to all farmers during the peak period was ranked first whereas poor information accessibility and utilization of weather based agro advisory services by the farmers was ranked as second major constraint faced by the farmers probably due to the lack of awareness, hands on experience in utilizing ICT platforms, etc. lack of adequate trainings on CRA technologies based on need was reported the third main constraint that farmers must overcome probably due to the inadequate trainings provided covering various sections of the respondents. The lack of support from line departments was the fourth major constraint faced by the farmers could be due to the lack of convergence of various line departments in the project implementation.

CONCLUSION

The farmer's faced multiple constraints and challenges while adopting climate resilient agricultural technologies. Major constraints faced by the farmers such as interest to follow conventional practices, inability to accept new practices, inadequate institutional financial support, lack of savings, inadequate services through CHCs, lack of timely availability of improved seed, Inability of the officials to provide services to all farmers during the peak period etc., shall have to be looked into for the adoption of CRA technologies with efficacy by the farmers. The present study could aid in redesigning the previously implemented

interventions and frame suitable strategies which could resolve the constraints that farmers encounter and promote community mobilization for a higher rate of adoption of CRA technologies.

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