Original Research Article

A Study on Adoption of Climate Resilient Technologies (CRTs) in Adopted Villages of Bandipora District under National Initiative on Climate Resilient Agriculture (NICRA) Project

Comment [A1]: Authors should pay attention to the writing guidelines from IJPSS

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Abstract

The need to study the extent of adoption of climate resilient technologies (CRTs) under the changing climatic conditions have beenat the centre of focus of many extension programmes, aimed at improving livelihood security under the currentscenario. Astudy was conducted on"Adoption of Climate Resilient Technologies under NICRA Project" in District Bandipora of Kashmir valley to assess the adoption rate of technologies demonstrated under the Project "National Initiative on Climate Resilient Agriculture" through Krishi Vigyan Kendra (KVK), Bandipora.Eighty beneficiaries were selected from 4 strata by proportionate allocation method. In addition to this, 40 non-beneficiaries were also selected from same villages by simple random sampling technique. The data was elicited through personal interview method which was pre-tested in the sampled area but those respondents were not taken for final study. The important findings of the study were; Majority of the beneficiaries had medium (57.50 %), followed by high (37.50%) and low (5.00%) level of adoption of climate resilient technologies (CRTs). The non-beneficiaries had low (80.00%), followed by medium (20.00%)level of adoption of CRTs. No non-beneficiary had high level of adoption regarding climate resilient practices / technologies.. The mean Adoption score of beneficiaries (34.96%) was much higher than that of non-beneficiaries (19.05%).

Comment [A2]: Abstract must contain: Problems, objectives, methods, results, conclusions, suggestions/recommendations. Please provide concrete recommendations on the results of your study.

Keywords: Adoption, Climate resilient technologies, KVK and NICRA

Introduction

Climate change is one of the biggest environmental challenges of present times. The term climate change has been defined by International Panel on Climate Change (IPCC) as any change in climate over time, whether due to natural variability or/and as a result of human activity (IPCC, 2007). It has become a major concern to society because of its potentially adverse impacts on livelihood and food security worldwide. The current and future impacts of climate change are the major sources of concern in south Asia due to predominance of rainfed / subsistence agriculture in the region and the Indian region is also affected by extreme weather events and by long term climate variability which can severely reduce the crop yields and can increase the levels of uncertainty with respect to agricultural production and output prices. The situation can further lead to vulnerability of small and marginal farmers living in this himalayan region. According to Feder *et al* (1990) farm household adopt new technology when they expect a more profitable outcome than what they gained from existing traditional technologies or other previously available technologies. Therefore, by adopting

Comment [A3]: There is no reference to this quote in the bibliography. Please add references or better delete them.

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climate resilient technologies, the farming communities can significantly improve their livelihood securities. India, like most other developing countries, is more exposed to the implications of climate change in view of the large portion of population depending on agriculture; any adverse impacts on these natural resources will have consequences on the nation's livelihood security and economy. Future projections based on observed climate trends indicate that the global temperatures are consistently rising at an alarming rate compared to the global average during the 21st century. Therefore, it is most likely, India might be strongly affected by changing climate scenario. In India, noticeable negative impacts are implicit with medium-term (2010-2039) climate change, foretold to reduce yield of major crops by 4.5 to 9 %, that adds to about 1.5 per cent of GDP per annum (Venkateswarlu*et. al*, 2013).Increasing agricultural productivity through the adoption and diffusion of modern agricultural technologies is recognised as one of the key pathways for economic and agricultural transformation in developing countries, particularly in regions experiencing huge adverse effects of climate change. Hence there is a need to concentrate more on Climate smart technologies capable of mitigating the adverse effects of climate change, the climate smart agriculture concept was proposed by Food and Agriculture organization of the United Nations (FAO) at the Hague conference on Agriculture, Food security and Climate change in the year 2010. Climate smart agriculture is an approach to agriculture development that aims to address the challenges of food security and climate change.Therefore, enhancing resilience of agriculture to climate change through adequate and relevant adaptation and mitigation strategies should be prioritized. National Innovations on Climate Resilient Agriculture (NICRA) is a network project of the Indian Council of Agricultural Research (ICAR). The Project was launched during February, 2011. The aims of the project were to enhance climate resilience agriculture through strategic research and technology demonstration which covers agricultural and horticultural crops, fisheries livestock and natural resource management. The NICRA project consists of four components: i) Strategic Research, ii) Technology Demonstration, iii) Capacity Building and iv) Sponsored/Competitive Grants. The present study is expected to be very relevant for the national level organizations, NICRA, planners, policy makers, and researchers to identify points of success and failures, thus to reshape further steps of their action. Relevance of the study has been enriched by some proposals for up-scaling these technologies to more compatible, convenient but advanced levels. Further, the study will offer few recommendations to facilitate replication of project activities in other parts of the country. The Primary motivation behind the present study is the estimation of overall adoption of the climate resilient technologies in the study area.

Comment [A5]: Quotations using square brackets contain a sequence of numbers.

Comment [A6]: In the background it is necessary to explain information from secondary data about the condition of the proportion of farmers who already know and do not know CRTs at the sampling location.

Comment [A7]: Insert the citation source.

Materials and Methods

To investigate the adoption of Climate Resilient Technologies (CRTs) introduced through the Project,"National Initiative on Climate Resilient Agriculture (NICRA),"the study was conducted in Bandipora District of Jammu and Kashmir, which was selected purposively because of being the only District of north Kashmir in which the project is functional since 2014 and implemented by Krishi Vigyan Kendra, Bandipora of SKUAST-Kashmir. The Kendra has adopted 12 villages of the District under the project. A list of Project beneficiaries was obtained from Krishi Vigyan Kendra, Bandipora which depicted the distribution of the respondents in these villages;as the beneficiaries and non-beneficiaries of the Project area were the respondents of the study. The proportionate allocation

method was employed to select 80 beneficiaries from the selected villages and 40 non-beneficiaries were also taken for study selected by simple random sampling technique as a control group, therefore the total sample size for the study was 120 (80 beneficiaries and 40 non-beneficiaries).

Comment [A8]: Provide further explanation, what is the basis for determining the sample size. Include the citation source.

Results and Discussion

Adoption of climate resilient technologies by respondents.

Adoption of the climate resilient technologies is the extent to which the respondents accepted, integrated and used the new technologies, ideas or practices in farming for enhanced resilience, adaptation and mitigation to extreme weather conditions. The data about the overall adoption of the respondents is depicted in the Table

Table 1: Overall Adoption of the Respondents.

S.No	Category (Score)	Beneficiaries		Non-Beneficiaries	
		Frequency	Percentage	Frequency	Percentage
1	Low Adoption (Up to 20)	04	5.00	32	80.00
2	Medium Adoption (20-40)	46	57.50	08	20.00
3	High Adoption (Above 40)	30	37.50	0	0.00
Mean		34.96		19.05	
Standard Deviation		8.75		6.34	

Interpretation of the data presented in table-1 reveals that majority (57.50 %) of the beneficiaries of the Project areahad medium adoption followed by 37.50 per cent of the beneficiaries with high adoption and remaining 05.00 per cent of the beneficiaries had low adoption of climate resilient technologies. As far as the non-beneficiaries farmers are concerned fourth- fifth (80 %) of them had low adoption and rest one-fifth (20.00 %) of the non-beneficiaries had medium level of adoption about the climate resilient technologies demonstrated under NICRA Project.

Comment [A9]: The discussion section must be supported by the results of a similar study of at least 2-3 pieces of research sourced from the Journal, either to support or contradict the results of this study.

Practice wise adoption of climate resilient technologies by respondents.

The practice wise adoption of the climate resilient technologies by the respondents was investigated to know the practices which have higher adoption and those with least adoption. The data in table 2 depicts the practice wise adoption of the demonstrated climate resilient technologies.

Table 2:Level of Adoption of demonstrated climate resilient practices.

Practice	Categories	Beneficiaries		Non-beneficiaries	
		Frequency	Percentage	Frequency	Percentage
Recommended varieties	Low	26	32.50	32	80.00
	Medium	51	63.75	08	20.00
	High	03	03.75	00	00.00
Sowing time	Low	05	6.25	12	30.00
	Medium	60	75.00	27	67.50
	High	15	18.75	01	02.50
Spacing	Low	38	47.50	28	70.00
	Medium	41	51.25	12	30.00

	High	01	1.25	00	00.00
Seed rate.	Low	29	36.25	35	87.50
	Medium	49	61.25	05	12.50
	High	02	2.50	00	00.00
Water management	Low	12	15.00	20	50.00
	Medium	54	67.50	19	47.50
	High	14	17.50	01	02.50
Nutrient management	Low	28	35.00	28	70.00
	Medium	41	51.25	12	30.00
	High	11	13.75	00	00.00
Soil management	Low	21	26.25	27	67.50
	Medium	46	57.50	13	32.50
	High	13	16.25	00	00.00

Adoption of recommended varieties.

It is clear from the table 2 that majority (63.75 %) of the beneficiaries had medium adoption of recommended climate resilient varieties, followed by 32.50 per cent of the beneficiaries having low adoption of the recommended varieties and only 03.75 per cent of the beneficiaries had high adoption of recommended varieties. in case of non-beneficiaries, majority (80.00 %) had low adoption of the recommended varieties, 20.00 per cent of the non-beneficiaries had medium level of adoption about climate resilient varieties. None of the non-beneficiaries had high level of adoption of recommended varieties. The data in the Table 2 further reveals that 36.25, 61.25 and 2.50 per cent of the beneficiaries were having low, medium and high adoption of the recommended seed rate, while as majority (87.50 %) of the Project beneficiaries and 12.50 per cent of the non-beneficiaries were having low and medium level of adoption regarding the seed rate, it is worth to mention that none of the non-beneficiaries was found in the high adoption category regarding the seed rate.

Comment [A10]: The discussion section must be supported by the results of a similar study of at least 2-3 pieces of research sourced from the Journal, either to support or contradict the results of this study.

Correlation studies between adoption and independent variables.

The independent variables were also correlated with extent of adoption of climate resilient technologies. The correlation was separately worked out for the beneficiaries and non-beneficiaries of NICRA Project and the results are presented in table 3 as under:

Table 3: Correlation coefficients of selected independent variables with the level of adoption of respondents.

S.No	Variable	Beneficiaries		Non-beneficiaries	
		'r' Value	'p' Value	'r' Value	'p' Value
1	Age	0.294	0.008**	-0.157	0.332^{NS}
2	Gender	-0.325	0.003**	-0.157	0.332^{NS}
3	Marital status	-0.232	0.038*	-0.109	0.503^{NS}
4	Education	0.369	0.001**	0.387	0.014*
5	Family size	0.287	0.010**	-0.045	0.785^{NS}
6	Total land holding	0.464	0.000**	0.345	0.029*

7	Occupation	0.589	0.000**	0.414	0.008**
8	Annual income	0.622	0.000**	0.183	0.259^{NS}
9	Experience in farming	0.147	0.193^{NS}	-0.180	0.267^{NS}
10	Trainings attended	0.807	0.000**	0.399	0.011**
11	Extension contacts	0.704	0.000**	0.231	0.152^{NS}
12	Sources of information	0.679	0.000**	0.512	0.000**
13	Scientific orientation	0.675	0.000**	0.729	0.000**
14	Economic motivation	0.704	0.000**	0.580	0.000**
15	Innovativeness	0.646	0.000**	0.657	0.000**

*** Correlation is significant at the 0.05 level ** Correlation is significant at the 0.01 level NS-Non-significant.**

From the Table-3, it is elucidated in case of beneficiaries of the Project, independent variables such as age, educational qualification, family size, land holding, occupation, annual income, trainings attended, extension contacts, sources of information, scientific orientation, economic motivation and innovativeness had a positive and significant relationship with the level of adoption of the beneficiaries whereas, gender and marital status had a negative significant relation with the adoption level of respondents. However farming experience had non-significant relation with the adoption level of beneficiaries.

The data presented in table 3 further reveals that in case of non-beneficiaries, education, total land holdings, occupation, and trainingsattended sources of information, scientific orientation, economic motivation and innovativeness had a positive and significant relation with level of adoption of the non-beneficiaries. The independent variables like annual income and extension contacts had positive but non-significant, however age, marital status, gender, family size and experience in farming had a negative but non-significant relation with the adoption level of non-beneficiaries.

The majority (57.50 %) of the beneficiaries had medium adoption, whereas about fourth- fifth (80 %) of non-beneficiaries had low level of adoption. This might be due to the fact that the respondents were skeptical about the climate resilient technologies. Further the respondents had low to medium innovativeness and were reluctant to change their old age cultivation practices

Comment [A11]: The discussion section must be supported by the results of a similar study of at least 2-3 of research sourced from the Journal, either to support or contradict the results of this study.

Conclusion

It may be concluded that adoption of climate resilient crop varieties can help the farmers living in hill and mountain agro-ecosystem to cope upbetter with changing and abrupt climatic shocks. It is evident from the study that the middle aged beneficiaries dominated the adoption of climate resilient crop varieties and in case of beneficiaries of the Project area, independent variables such as age, educational qualification, family size, land holding, occupation, annual income, trainings attended, extension contacts, sources of information, scientific orientation, economic motivation and innovativeness had a positive and significant relationship with the level of adoption of the beneficiaries

whereas gender and marital status had a negative and significant relation with the adoption level of respondents. However farming experience had non-significant relation with the adoption level of beneficiaries.

Comment [A12]: Conclusions must answer the objectives, please check again whether the research objectives have been answered or not. The conclusion is not writing down demographic types, but explaining what decisions were made.

Comment [A13]: The minimum number of libraries is 15 references.

References colored in red cannot be found in the manuscript. Please add citations or preferably delete all the references marked in red.

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