Extent of Adoption Regarding Recommended Cultivation Practices of Landraces by the Beneficiaries of Global Environment Facilities

ABSTRACT

The present study examined the adoption levels among 113 kharif crop growers in Osian tehsil (Jodhpur) and Chohtan tehsil (Barmer) of Rajasthan. Results indicated that 64 respondents (56.64%) exhibited medium adoption, 36 of them (31.86%) showed high adoption, and 13 respondents (11.50%) had low adoption levels of recommended practices. Practice-wise analysis revealed the highest adoption in "Sowing of seed" (87.33 MPS), followed by "Spacing" (85.00 MPS), "Harvesting" (81.67 MPS), and "Storage" (80.00 MPS). Lower adoption rates were observed in "Fertilizer application" (61.33 MPS), "Seed treatment" (67.67 MPS), and "Plant protection measures" (78.67 MPS). Multiple regression analysis of independent variables with adoption showed that family type, income level and social participation had positive relationship were adoption whereas age, caste, occupation, level of education and land holding had negative association with adoption. These findings underscore the varied adoption levels across different practices, highlighting areas for targeted intervention to enhance overall compliance with recommended cultivation techniques.

Keywords: Adoption, Cultivation Practices, Landraces, Beneficiaries, GEF.

1. INTRODUCTION

The cultivation of landraces, traditional varieties of crops that have been developed through natural processes rather than through modern breeding techniques, holds immense potential for sustainable agriculture. The term "landrace" has generally been defined as a cultivated, genetically heterogeneous variety that has evolved in a certain ecogeographical area and is therefore adapted to the edaphic and climatic conditions and to its traditional management and uses. Adapting historical landraces to present agricultural conditions using cutting-edge breeding technology represents a challenging opportunity to use them in a modern sustainable agriculture, as an immediate return on the investment is highly unlikely. Consequently, we propose a more inclusive definition of landraces, namely that they consist of cultivated varieties that have evolved and may continue evolving, using conventional or modern breeding techniques, in traditional or new agricultural environments within a defined ecogeographical area and under the influence of the local human culture (Casañas, 2017)**.** These landraces are often better adapted to local environmental conditions, possess unique traits valuable for food security, and contribute to biodiversity. However, the widespread adoption of recommended cultivation practices for these landraces remains a critical challenge. This study explores the extent of adoption of these practices among beneficiaries of the Global Environment Facilities (GEF), a major international organization that funds projects related to environmental sustainability[8,9,10].

At the international level, the Global Environment Facilities was endorsed by the governing bodies of UNDP, UNEP, and the World Bank. It also served as the interim financial mechanism for the Framework Convention on Climate Change and the Convention on Biological Diversity. Far from being singularly oriented toward getting projects underway, the GEF's future was now intimately bound to other international instruments. Furthermore, the linkages between the restructured GEF and national priorities had been substantially strengthened (Sjöberg**,** 2017). The, GEF plays a pivotal role in addressing global environmental issues by providing grants and funding to various projects aimed at protecting biodiversity, mitigating climate change, and promoting sustainable land management. One of the key areas of focus for the GEF is the preservation and sustainable use of genetic resources, including landraces. By supporting the cultivation of landraces, the GEF aims to enhance agricultural biodiversity, improve resilience to climate change, and ensure food security for future generations.

The GEF was to provide financing to combat global environmental problems in four areas: climate change, biodiversity, ozone depletion, and international waters. There were both political and intellectual reasons for formulating its mandate around strictly global problems. By the late '80s, global environmental problems had emerged as a major public concern in developed countries. In particular, climate change, depletion of stratospheric ozone, and conservation of biological diversity were widely debated in the media and among scientists at this time. The logic of funding for the planet implies that resources would be spent in those areas where the greatest effect for the money could be found, independently of national borders. However, while developed countries could afford contributions for the globe, developing countries could not be expected to devote scarce resources to the long-term welfare of the planet while facing the immediate needs of their people. The GEF was hence designed to make it financially possible for developing countries to incorporate global environmental considerations alongside national development priorities. It was decided that eligibility for funds would be limited to countries with a per capita income of USD 4,000 or less, which roughly corresponded to definitions of developing countries used by UNDP and the World Bank. Al though the exclusive allocation of GEF funds to developing countries creates an inescapable redistributive quality, interpreting GEF funds simply as assistance to recipient countries misrepresents the original purpose. The aim was to create benefits for the earth as a whole, and the funds were to enable developing countries to be full Participants in this effort (Sjöberg, 2017).

The adoption of recommended cultivation practices for landraces involves various strategies and techniques designed to maximize the benefits of these traditional varieties. These practices may include proper seed selection, soil fertility management, pest and disease control, and sustainable harvesting methods. Despite the clear advantages of adopting these practices, several factors influence the extent to which they are implemented by farmers. These factors can range from socio-economic conditions, access to resources, knowledge and awareness, to institutional support and market dynamics. Understanding the extent of adoption of these practices among GEF beneficiaries is crucial for several reasons. Firstly, it provides insights into the effectiveness of GEF-funded projects in promoting sustainable agriculture and biodiversity conservation. Secondly, it identifies the barriers and challenges faced by farmers in adopting these practices, which can inform future interventions and policy decisions. Lastly, it highlights the successes and best practices that can be replicated and scaled up in other regions.

A thorough examination of the extent of adoption requires a multidimensional approach. This includes assessing the level of awareness and knowledge among farmers regarding recommended practices, evaluating the socio-economic conditions that facilitate or hinder adoption, and analysing the role of local institutions and extension services in supporting farmers. In context to institutional support, one project entitled **"Mainstreaming agricultural biodiversity conservation and utilization in the agricultural sector to ensure ecosystem services and reduce vulnerability"** funded by UN Environment-Global Environment Facilities (GEF) is being implemented by Agriculture University, Jodhpur. Moreover, the impact of market access and economic incentives on farmers' decisions to adopt these practices cannot be overlooked.

The adoption of recommended cultivation practices for landraces is not only about preserving genetic diversity but also about empowering local communities and enhancing their livelihoods. By promoting these practices, the GEF aims to create a sustainable agricultural system that is resilient to environmental changes and capable of meeting the growing food demands. This study, therefore, seeks to shed light on the current status of adoption among GEF beneficiaries and provide actionable recommendations for improving the uptake of these practices. The adoption of recommended cultivation practices for landraces by beneficiaries of the Global Environment Facilities is a topic of significant importance for sustainable agriculture and biodiversity conservation. By understanding these dynamics, we can better support farmers in their efforts to cultivate landraces sustainably, ensuring the preservation of valuable genetic resources and contributing to global food security.

2. MATERIAL AND METHODS

The research methodology for the study titled "Extent of Adoption Regarding Recommended Cultivation Practices of Landraces by the Beneficiaries of Global Environment Facilities" was designed to provide a comprehensive analysis of the adoption rates of recommended cultivation practices among farmers in the Jodhpur and Barmer districts of Rajasthan, India. The study focused on the tehsils of Osian in Jodhpur and Chohtan in Barmer, where the Global Environment Facilities (GEF) project was actively implemented.

2.1 Study Area Selection

The districts of Jodhpur and Barmer were chosen based on their ecological significance and the presence of the GEF project aimed at promoting sustainable agricultural practices. Within these districts, Osian tehsil in Jodhpur and Chohtan tehsil in Barmer were selected due to the project's implementation in these areas. This purposive selection ensured that the study focused on regions with active engagement in recommended cultivation practices for landraces.

2.2 Village Selection

From each selected tehsil, two villages were purposively chosen based on their involvement in the GEF project. In Osian tehsil, the villages Mansagar and Govindpura were selected. Similarly, in Chohtan tehsil, the villages Dhok and Dhirasar were chosen. This selection criterion ensured that the study targeted areas where the project's influence was most significant, providing a relevant context for assessing the adoption of recommended practices.

2.3 Respondent Selection

The study targeted a specific group of farmers to gather relevant data on the adoption of cultivation practices. A comprehensive list of project beneficiaries was obtained, and 113 respondents were selected based on two key criteria: their year of engagement with the project and their cultivation of kharif crops. This purposive sampling ensured that the respondents had sufficient exposure to the recommended practices and were actively involved in kharif crop cultivation, making them suitable for the study.

2.4 Data Collection

Data collection involved a structured survey method to gather detailed information on the extent of adoption of recommended cultivation practices. The survey included questions on various aspects such as seed selection, soil fertility management, pest and disease control, and sustainable harvesting methods. The collected data were analysed using both qualitative and quantitative methods. Descriptive statistics were used to summarize the adoption rates and identify patterns among the respondents.

2.5 Analysis of Adoption

The extent of the adoption of landraces was measured on a three-point continuum i.e. fully, partially and not at all. Nine packages of practices of landraces production were included in the schedule. The practices were further divided into sub-questions. Finally, the adoption index was calculated by using the following formula:

$$\text{Adoption Index} = \frac{\text{Total adoption score obtained by respondents}}{\text{Maximum attainable score}} \times 100$$

The formula was applied for all the practices, which helped in calculating the adoption index.

The mean and standard deviation of all the respondent's adoption scores were computed for classifying the adoption in different categories. Based on the mean adoption score and standard deviation, the respondents were categorized into three adoption level categories, namely low, medium, and high as follows:

Low adoption level = Score below (mean adoption - SD)
Medium adoption level = Score from (mean adoption - SD) to (mean + SD)
High adoption level = Score above (mean adoption + SD)

Apart from this a multiple regression model was also applied to analyse the relationship between independent antecedents and adoption. The model encompasses Unstandardized Coefficients are B and Standard error (Std. Error) in which B are the raw coefficients representing the change in the dependent variable for each one-unit change in the predictor variable, holding all other variables constant whereas Std. Error is the standard error of the coefficient, which measures the average distance that the observed values fall from the regression line. Standardized Coefficients are Beta, they have been adjusted for the different scales of the variables. They show the relative importance of each predictor variable. t is the t-statistic for each predictor, calculated as the coefficient divided by its standard error. It is used to test the null hypothesis that the coefficient is equal to zero (no effect). Significance (Sig.) is the p-value associated with the t-statistic, indicating the probability that the observed relationship is due to chance. A common threshold for statistical significance is 0.05.

3. RESULTS AND DISCUSSION

3.1 Extent of adoption of recommended cultivation practices of landraces

Adoption is a mental process. In the recent times, a number of innovations are being generated by our agricultural scientists but all the innovations are not being adopted by the members of social system. Adoption of innovation depends upon the knowledge of adopters about innovation, innovativeness, complexity, visibility and capability of innovations. It is generally accepted that if an individual has knowledge about different aspects of technologies, he is likely to adopt it with high speed and high adoption rate. Therefore, adoption of technology becomes central concern of social scientists. Thus, the objective pertaining to adoption of recommended cultivation practices of landraces included in the present investigation.

To get an overview of the adoption level of the farmers about recommended cultivation practices of landraces the farmers were grouped into low, medium and high adoption categories on the basis of calculated mean and standard deviation of the obtained scores by the respondents.

3.2 Distribution of respondents according to extent of adoption of recommended cultivation practices of landraces

The data in following table reveal that 64 respondents (56.64 percent) fall in medium adoption category, whereas 36 respondents (31.86 percent) were found in high adoption category and remaining 13 respondents (11.50 percent) possessed low adoption level about recommended cultivation practices of landraces.

The accordant results were found by Yadav and Khan (2012) and Choudhary *et al.* (2018).

Table 1. Distribution of respondents according to extent of adoption of recommended cultivation practices of landraces

n=113

S. No.	Adoption level	Frequency	Percentage
1	Low (score blow 18.02)	13	11.50
2	Medium score from 18.02 to 23.60)	64	56.64
3	High (score above 23.60)	36	31.86
Total		**113**	**100**

$\bar{X}$ = 20.81 **σ = 2.79**

3.3 Practice wise adoption by respondents regarding recommended cultivation practices of landraces

The level of adoption of farmers was measured for nine cultivation practices of landraces. Efforts were made to include only those practices which can be adopted by the farmers practically in the field. The mean percent score (MPS) of each practice was calculated and ranks were assigned accordingly. Data in this regard are presented in table below.

The results exhibit practice wise adoption level of the respondents in which adoption level about “Sowing of seed” is highest i.e. (87.33 MPS) followed by “Spacing” (85.00 MPS), “Harvesting” (81.67 MPS), “Storage” (80.00 MPS), “Plant protection measures” (78.67 MPS), “Soil and filed preparation” (77.00 MPS), “Weed management” (75.33 MPS), “Seed treatment” (67.67 MPS) and “Fertilizer application” (61.33 MPS), respectively.

These findings are in accordance with the findings of Jat (2011) and Agarwal (2000).

Table 2. Practice wise adoption by respondents about recommended cultivation practices of landraces

n=113

S. No.	Package of practices	MPS	Rank
1	Soil and field preparation	77.00	6
2	Seed treatment	67.67	8
3	Sowing of seed	87.33	1
4	Spacing	85.00	2
5	Fertilizer application	61.33	9
6	Weed management	75.33	7
7	Plant protection measures	78.67	5
8	Harvesting	81.67	3
9	Storage	80.00	4

4. Multiple regression analysis of independent variables with Adoption

The following table presents the results of a multiple regression analysis where various independent variables are evaluated for their effect on the dependent variable "Adoption." Model indicates the specific model used in the regression analysis. Since there is only one model, it is labelled "1. Unstandardized Coefficients are B and Standard error (Std. Error) in which B are the raw coefficients representing the change in the dependent variable for each one-unit change in the predictor variable, holding all other variables constant whereas Std. Error is the standard error of the coefficient, which measures the average distance that the observed values fall from the regression line. Standardized Coefficients are Beta, they have been adjusted for the different scales of the variables. They show the relative importance of each predictor variable. t is the t-statistic for each predictor, calculated as the coefficient divided by its standard error. It is used to test the null hypothesis that the coefficient is equal to zero (no effect). Significance (Sig.) is the p-value associated with the t-statistic, indicating the probability that the observed relationship is due to chance. A common threshold for statistical significance is 0.05.

Table 3. Multiple regression analysis of independent variables with Adoption

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	40.392	6.161		6.556	.000
	Age	-.095	.051	-.201	-1.855	.066
	Caste	-.194	.794	-.023	-.245	.807
	Family type	1.306	.707	.179	1.846	.068
	Occupation	-1.824	1.662	-.105	-1.097	.275
	Education	-.103	.359	-.029	-.287	.774
	Land Holding	-3.680	1.043	-.603	-3.530	.001
	Income	2.207E-5	.000	.324	1.876	.063
	Social Participation	.196	1.074	.017	.182	.856

*Dependent Variable: Adoption

The data in the table depicts that the age of individuals has a B value of -.095 which means it has negative relationship with adoption. Age variable has the Std. Error value of .051 and Beta and t values of -.201 and -1.855, respectively. It has significance (p-value) value of .066, it shows that age is not statistically significant at the 0.05 level of significance. In context to the caste of individuals, it has a B value of -.194 which means it has negative relationship with adoption. Caste variable has the Std. Error value of .794; Beta and t values of -.023 and -.245, respectively. It has significance (p-value) value of .807, it shows that caste is not statistically significant at the 0.05 level.

Regarding the Family type of individuals, it has a B value of 1.306 which shows the positive relationship with adoption. It has the Std. Error value of .707; Beta and t values of .179 and 1.846, respectively. It is also not statistically significant at the 0.05 level with a significance (p-value) value of .068. The occupation of individuals has a B value of -1.824 which expresses its negative relationship with adoption. Std. Error, Beta and t has the values of 1.662, -.105 and -1.097 respectively. With a significance (p-value) value of .275 the occupation is also not statistically significant. Respondents' level of education has negative relationship with adoption, having a B value of -.103. This variable has Std. Error .359, Beta -.029 and t value of -.287. It has significance (p-value) value of .774 that is not statistically significant.

Land Holding of respondents was the only variable which has significance (p-value) value of .001 that is highly significant. With a B value of -3.680 it has negative relationship with Adoption. Other values such as Std. Error, Beta and t were 1.043, -.603 and -3.530, respectively. The income level has positive association with adoption with a B value of 2.207. Beta value was .324 and t value was 1.876. The significance (p-value) value stands at .063 that is not statistically significant. Social Participation aspect also had positive association with adoption having a B value of .196. Std. Error value was 1.074, Beta value was of .017and t value was of.182. The significance (p-value) value of .856 showed that it was not statistically significant.

5. CONCLUSION

The study titled "Extent of Adoption Regarding Recommended Cultivation Practices of Landraces by the Beneficiaries of Global Environment Facilities" reveals significant insights into the adoption levels among kharif crop growers in Osian tehsil (Jodhpur) and Chohtan tehsil (Barmer), Rajasthan. The findings show that a majority of the respondents, 64 (56.64%), fall within the medium adoption category, while 36 respondents (31.86%) exhibit high adoption, and 13 respondents (11.50%) demonstrate low adoption of recommended practices.

These results highlight a generally positive trend in the adoption of recommended cultivation practices among GEF beneficiaries, with specific practices being more readily adopted than others. The high adoption levels for key practices such as sowing and spacing suggest a strong understanding and implementation of foundational agricultural

techniques. However, the lower adoption rates in seed treatment and fertilizer application point to areas requiring targeted interventions and enhanced training. This study underscores the need for continued support and education to improve the adoption of all recommended practices, ensuring the sustainable cultivation of landraces and the overall success of GEF initiatives.

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REFRENCES

1. Agarwal JK. Knowledge and adoption of recommended pea cultivation practices in Jaipur district of Rajasthan. MSc (Ag.) Thesis, Rajasthan Agriculture University, Bikaner, campus: Jobner. 2000.

2. Choudhary R, Bhadu K, Poonia T. To study on gap in technology adoption in rapeseed-mustard cultivation in Ambala. Bull Envi, Pharm Life Sci. 2018;7.

3. Jat LR. Knowledge and adoption of recommended cultivation practices of barley by the farmers of Jaipur district of Rajasthan. M.Sc. (Ag.) Thesis (unpublished), SKRAU, campus: Jobner. 2011.

4. Yadav BS, Khan IM. Adoption of improved cultivation practices of cauliflower. Ind J Soc Res. 2012;53(3):191-197.

5. Sjöberg H. The global environment facility. Routledge. 2017;148-162.

6. Casañas F, Simó J, Casals J, Prohens J. Toward an evolved concept of landrace. Fronti Pt Sci. 2017; 245305.

7. Choudhary, R., Diwakar, A. K., Meena, A. K., Shukla, S., & Prakash, C. (2024). Assessment Of Fertility Status Of Soils Under Different Cropping Patterns In Rainfed Semi-Arid Eastern Plain Of Rajasthan, India. *International Journal Of Environment And Climate Change*, *14*(5), 192-204.

8. Amonum JI, Bada SO. Adoption Level of Agroforestry Practices in Katsina State, Nigeria. Asian Res. J. Agric. [Internet]. 2019 May 9 [cited 2024 May 30];11(2):1-10. Available from: https://journalarja.com/index.php/ARJA/article/view/215
9. Srinivas A, Sukanya T, Rao B. Farmers' Adoption of Finger Millet Production Technologies and the Impact on Finger Millet Yields. J. Exp. Agric. Int. [Internet]. 2024 Apr. 4 [cited 2024 May 30];46(5):518-25. Available from: https://journaljeai.com/index.php/JEAI/article/view/2406
10. Coromaldi M, Pallante G, Savastano S. Adoption of modern varieties, farmers' welfare and crop biodiversity: Evidence from Uganda. Ecological Economics. 2015 Nov 1;119:346-58.