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Extent of adoption of Agricultural Practices followed by Rice growers in response to the adverse impact of climate change in Coastal Odisha

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Abstract

An To enable farm people to increase their family food security, it is crucial to increase the extent to which diverse practises are adopted to combat climate change. The present study was undertaken to assess the extent of the adoption of different agricultural practices in rice crops in response to climate change. The study was conducted in the Jagatsinghpur district of Odisha . 2 blocks, 4 Gram panchayats, and 8 villages were chosen for the study 120 numbers of respondents by purposive sampling method. An ex-post facto research design was followed in this research. The findings of the study showed that giving protective irrigation in response to late monsoon with a mean score of 1.60 was the most adopted practice whereas resowing in case of low germination percentage with a mean score of 1.17 was the least adopted practice in the research area. Education, annual income, mass media exposure, extension contact, and farming experiences had a greater influence on the extent of adoption of practices in response to climate change. The conglomeration of education, annual income, mass media exposure, extension contact, and farming experiences of the farmers has attributed 75.3% to the extent of adoption of the practices.

Keywords: *Climate change, Extent of adoption, Education, Annual income, Mass media exposure, Extension contact, and Farming experiences*

Introduction

Rapid climate change is posing a severe threat to sustainable development in many parts of the world. Global greenhouse gas emissions are increasing at an unprecedented rate, accelerating the effects of climate change. Thus, the effects of climate change on food security and agricultural livelihoods affect a large number of urban and rural communities worldwide. Reduced crop yields, soil erosion, and water scarcity brought on by climate variability and change have a considerable negative influence on agriculture and constitute a danger to livelihood and food security on a regional and global level [1-2].

Due to their greater reliance on agriculture and allied sectors, these effects disproportionately harm the socio-economic growth of developing countries [6]. South Asia is considered one of the world's most susceptible regions, because of its significant susceptibility to hazards and calamities brought on by climate change [3-4]. Further evidence demonstrates that the region's food security may be seriously harmed by diminishing agricultural productivity, where food production must quadruple by the end of this century [5].

Low-land rice is a water-intensive crop; therefore climate change has provided a significant challenge to it. Rice production is directly impacted by the fluctuation of climatic elements, including sun radiation, rainfall, and temperature, as these are crucial determinants of rice growth and development [8]. Rice production can be indirectly impacted by

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Table 1

DISTRICT	BLOCK	GRAM PANCHAYAT	VILLAGES
JAGATSINGHPUR	TIRTOL	TULANGA	SRIRAMPUR
			NARASINGHPUR
		GARAMA	TULASIPUR
			BALIMUNDALI
	RAGHUNATHPUR	GUALIPUR	KAPALESWAR
			PATENIGAN
		TARAPUR	TARAPUR
			GOKALPUR

Table 2 Distribution of respondents according to their adoption strategies.

Sl. no	Condition	Adoption strategy	Adopted		Not adopted		Mean score	Rank
			f	%	*f*	%		
1	Late onset of monsoon	Adjusting sowing date according to onset of monsoon	64	53.34	56	46.66	1.53	II
		Give protective irrigation whenever possible.	72	60	48	40	1.60	I
		If germination is less than 50% resowing immediately after receipt of rain	21	17.50	99	82.50	1.17	VIII
2	Drought	Avoid variety which need assured moisture	29	24.17	91	75.83	1.24	V
		Split application of nutrients in case of soil moisture stress (urea, DAP)	22	18.34	98	81.66	1.18	VII
		in situ moisture conservation (use of mulches)	43	35.84	77	64.16	1.35	III
3	Pest and diseases	Blast-Spray carpropamid fungicide 25 gm in 10 lit of water	41	34.17	79	65.83	1.34	IV
		False smut-Seed treatment with fungicide vitavax or carbendazim @500gm/ha	28	23.34	92	76.67	1.23	VI

climate change due to water scarcity, altered soil moisture content, flooding, and pest and disease outbreaks. [9]. Aside from that, climatic variability can have a negative impact on crop and animal productivity by causing extreme weather events like torrential floods and drought [10].

Natural disasters have become commonplace in coastal Odisha, harming standing crops and reducing yields. The state appears to be experiencing climatic anarchy based on erratic weather patterns. It has now gone through more than ten years of contrasting extreme weather, from heat waves to cyclones, from droughts to floods [11]. The most fertile area of Odisha is along its coast, where 40% of the state's annual rice production is produced. This represents the coastal Odisha region's contribution to the national food supply. On the Odisha coast, cyclones occur more frequently. In quick succession, several cyclones struck the state. Since 1965, practically every year has seen disastrous disasters in Odisha, including floods, droughts, and cyclones. Floods happened 17 times between 1965 and 2004, droughts happened 19 times, and cyclones struck the state 7 times (OSDMA 2011)

Farmers' understanding of climate change and their preparations for adaptation can be a useful starting point in lowering climate risks. In order to deal with losses or to take advantage of climate changes, farmers may modify their farming practises or procedures, such as crop production, soil and water management, flood management, land use, labour use, livestock

Graph 1 Mean score of extent of adoption of practices in response to climate change by rice growers

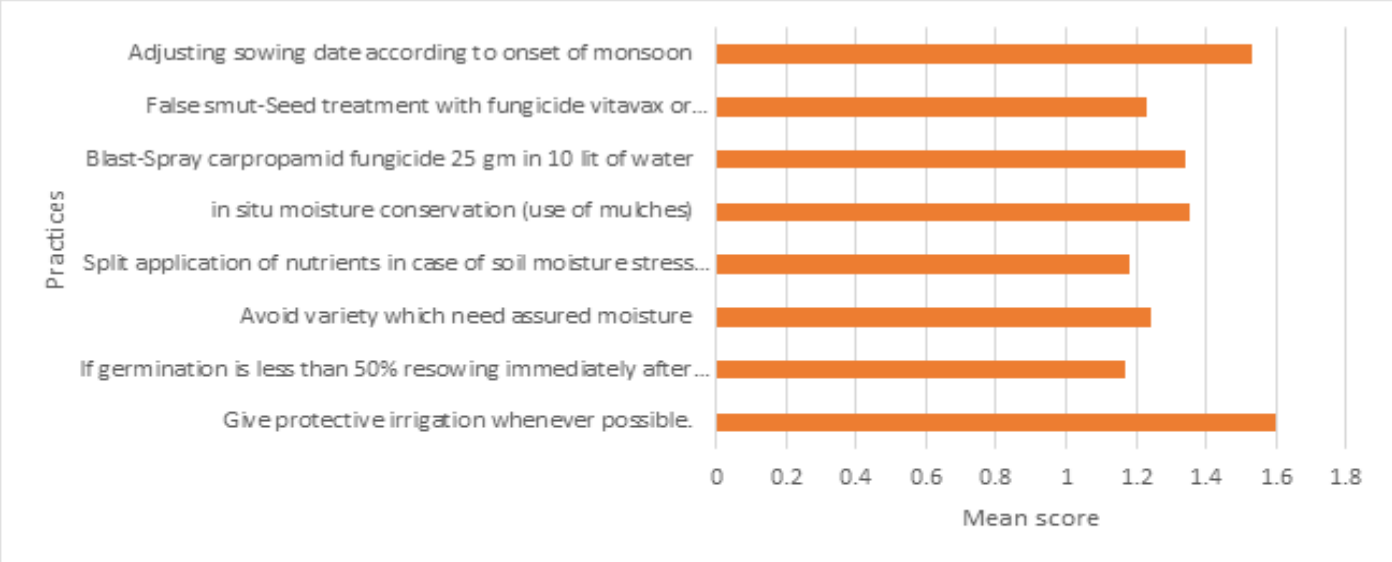

Table 3 Co-relation study of socio-economic variables with extent of adoption of practices in response to climate change

SL.NO	Characters	r value	t -calculated	t-tabulated (d. f.)
1	Age	0.114	1.123	2.617 At 0.01 level
2	Gender	0.167	1.547	
3	Education	0.354**	4.235**	
4	Caste	0.018	0.203	
5	Annual income	0.327**	3.787**	
6	Land holding size	0.020	0.181	1.980 At 0.05 level
7	Mass media exposure	0.429**	4.218**	
8	Extension contacts	0.341**	4.081**	
9	Farming experience	0.337**	4.002**	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4 Multiple regression analysis of socio-economic variables with the extent of adoption of practices in response to climate change

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	23.055	3.440		6.703	.000
	Age	.500	.412	.058	1.042	.243
	Education	2.108	.762	.341	3.724	.005**
	Gender	.534	.621	.041	.866	.383
	Caste	.003	.441	.000	.006	.995
	Annual income	2.361	.761	.115	3.101	.002**
	Land holding size	.790	.688	.097	1.147	.254
	Annual income	2.152	.740	.263	2.908	.004**

Continued.....

	Mass Media exposure	.334	.149	.131	2.105	.031**
	Extension contact	1.371	.284	.312	4.789	.002**
a. Dependent Variable: Obj-2						

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.867[a]	.753	.750	3.5135
a. predictors: (constant), land holding size, , caste, age, gender, mass media exposure, extension contact, education, annual income and farming experience				

management, financial management, and family management. In order to select the most effective adaptation strategies, it is imperative to include meteorological variables and evaluate the impact of non-climatic factors that have a significant impact on agriculture. Changes in planting dates, water-saving techniques, and cautious fertiliser management are among the adaption strategies that have been endorsed by numerous studies and papers in the literature. We haven't taken into account the reality that most farmers aren't familiar with climate-resilient agriculture practises while this is going on. However, producers modify their practises in this setting of climate change for sustainable yield. By making these behavioural adjustments, one might lessen susceptibility and improve one's "socio-economic status" and "well-being." Therefore, it is essential to record farmer-led climate change adaptation efforts.

Materials and methods:

Location of the study: The research study was conducted in Jagatsinghpur district of Odisha.

The above blocks, gram panchayats, and villages were selected by purposive sampling method. 120 rice growers were included in the study.

Collection of data:

The data were collected through a pre-structured interview schedule through personal interviews. The interview schedule contained a variety of practices that the farmers were adopting for rice cultivation in response to climate change. The rice grower's response were recorded a two-point continuum scale (adopted and not adopted).

Analysis of data: The collected data were arranged and analysed using statistical tools like frequency, percentage, mean score and rank order, and correlation.

MS= $\Sigma fx/ N$

Where, M.S. = mean score, Σx = Sum of total score obtained by the individual, N = Total no. of items / respondents.

Correlation co-efficient(R)= $\sum \frac{(xi-x)(yi-y)}{n.Ex.Ey}$

Where r = Coefficient of correlation, xi = ith value of x variables, x = mean of x variables, yi = ith value of y variables, y = mean of y variables, Ex = Standard deviation of series x , Ey =Standard deviation of series y , n=number of pair of observations of x and y

From the above table , it was observed that most of the rice growers practices providing protecting irrigation whenever possible in response to late monsoon with a mean score of 1.60 followed by adjusting the sowing date with a mean score of 1.53, in situ moisture conservation (mean score-1.35) in response to draught, spraying carpropamid fungicide 25 gm in 10 lit of water (mean score-1.34) in response to blast, avoiding variety which need assured moisture (mean score-1.24) in response to drought, Seed treatment with fungicide vitavax or carbendazim @500gm/ha (mean score-1.23) in response to false smut, Split application of nutrients in case of soil moisture stress (mean score-1.18) (urea, DAP) in response to draught and resowing immediately after receipt of rain If germination is less than 50% (mean score-1.17) in response to the late onset of monsoon.

The data reported in the above table revealed that, education, annual income, mass media exposure, extension contact, and farming experiences had a significant and positive relationship with the extent of adoption of strategies in response to climate

change. As most of the variables have t-calculated > t-tabulated, hence, H_1 is accepted indicating there is the existence of very significant relationship between socio-economic variables and extent of adoption of strategies in response to climate change.

In the table, regression analysis was performed to describe the impact of socio-economic variables selected for the study towards the extent of adoption of practices in response to climate change. It was concluded that, education, annual income, social participation and extension contact, and farming experience had a significant regressional impact on the extent of adoption. It can be concluded that this conglomeration of socio-economic variables has contributed to 75.3% of the extent of adoption.

Conclusion

The study concluded that giving protective irrigation in response to late monsoon was the most adopted practice whereas resowing in case of low germination percentage was the least adopted practice in the research area. Education, annual income, mass media exposure, extension contact, and farming experiences had greater influence on the extent of adoption of practices in response to climate change. The conglomeration of these factors has attributed 75.3% to the extent of adoption of the practices. Providing education, information related to climate resilient practices, and training on that types of practices can increase the extent of adoption.

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