

Disparities in Rice Farming Technology Among Tribal and Non-tribal Farming Communities of Chhattisgarh

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ABSTRACT

The scheduled tribes constituted a sizeable part in our Indian community. Their percentage are quite high in Chhattisgarh but the adoption of rice farming technologies by these community was poor than the non tribal farmers. The present study was conducted in Chhattisgarh with 480 respondents (240 tribal and 240 non-tribals). The findings supports that there is a wide gap between the adoption of improved rice farming technologies between tribal and non-tribal communities. For equity and sustainable development of this huge integral part of our society, whose main occupation is agriculture, special attention shall be made for improving their rice farming technology.

Introduction

During the last few decades there has been a rapid and consistent growth of conditions, more congenial for paving way to modernization, as an added dimension for social and economic transformation of societies. The tribal area of our country is still lagging behind in all agricultural and other developments. Only by acquiring equity amongst the tribal and non-tribal farming India can become leading agricultural power. Therefore, it is inevitable that the second green revolution has to come from the tribal areas and accordingly the application of technology, inputs and investments has to be tailored to convert these areas into productive green. In this context, the present study was carried out to analyze the existing agricultural practices in both tribal and non-tribal areas and to assess the level of disparities between them for equity and sustainable development.

Methodology

The Chhattisgarh state comprised of three agro-climatic zones and 16 districts. Out of 156 blocks in the study area, 16 blocks (8 tribal and 8 non-tribal) were selected by following stratified sampling method. Out of the total villages in each selected blocks, random sampling method was adopted to identify two villages for the purpose of this investigation. In this way, a total of 16 non-tribal and 16 tribal villages were incorporated in this study. Out of the total farm families of each selected village, representative 15 farm families were selected randomly for the study. In this way a total of 240 non-tribal and 240 tribal farm families were incorporated in this study to make a total of 480 respondents.

Results and Discussion

1. Major crops

The Table 1 shows that in addition

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Table 1 : Distribution of respondents according to cultivation of major crops

Major Crops	Tribal (n=240)		Non-tribal (n=240)	
	Frequency	Per cent	Frequency	Per cent
Rice	240	100.00	240	100.00
Kodo-kutki	39	16.25	7	2.92
Maize	46	19.17	29	12.08
Soybean	8	3.33	41	17.08
Other crops (vegetables, pigeonpea, sawan, etc.)	36	15.00	58	24.17
Rape-mustard	37	15.42	11	4.58
Grasspea	15	6.25	83	34.58
Wheat	8	3.33	31	12.92
Chickpea	13	5.42	60	25.00
Lentil	09	3.75	42	17.50
Mung/ Urid	19	7.92	34	14.17
Linseed	10	4.17	22	9.17
Other crops (vegetables, etc.)	46	19.17	41	17.08

to rice; maize and kodo-kutki are the other important kharif crops grown by the tribal respondents. Some kharif vegetable and pulses are also grown by more than 15 per cent of tribal respondents. In addition to rice, non-tribal respondents also grow other kharif crops.

Mustard is one of the major rabi crop grown in tribal areas. They are also cultivating niger, vegetables, kulthi, etc., crops in rabi season. Grasspea is the most popular rabi crop among non-tribal respondents followed by chickpea and lentil. Other rabi crops grown by them are moong, urid and linseed.

The finding clearly indicates that rice is the most popular crop of both the category of respondents.

2. Cropping intensity

The average cropping intensity in tribal areas is found to be 107.30 per cent, which is highly comparable with the 118.23 per cent cropping intensity of non-tribal respondents (Table-2). It was noted that almost 60 and 43 per cent tribal and non-tribal respondents, respectively had less than 110 per cent cropping intensity. The percentage of respondents having above 175 per cent cropping intensity was only 1.25

Table 2 : Distribution of respondents according to cropping intensity

Cropping Intensity (%)	Tribal (n=240)		Non-tribal (n=240)	
	Frequency	Per cent	Frequency	Per cent
100	84	35.00	93	38.75
101 - 110	62	25.83	10	4.17
111 - 125	39	16.25	46	19.17
126 - 150	31	12.92	43	17.92
151 - 175	21	8.75	34	14.17
Above 175	03	1.25	14	5.83
Average	107.30 per cent		118.23 per cent	

among tribal and 5.83 in case of non tribal respondents.

3. Pre-sowing and sowing practices in rice farming

All the respondents were found to be cultivating rice crop, therefore, the pre sowing activities of only rice crop was studied. It was found that majority of tribal and non-tribal respondents had 100 per cent cropped area under rice crop and only about 3 per cent of tribal and non-tribal respondents each had less than 50 per cent cropped area under rice. A good majority of tribal farmers are not adopting improved rice varieties and still rely on traditional varieties. While, the adoption of improved rice varieties was

4. Sowing method of rice

Broadcast *biasi* method is still popular and widely practiced by the 70.42 per cent tribal respondents and about 58 per cent non-tribal respondents. Transplanting, one of the improved method of sowing is more popular amongst the non-tribal respondents. All these findings clearly pointed out that tribal farmer is lagging behind than the non-tribal farmer. The age old practice of ploughing the standing rice fields at 25-40 days after sowing under sufficient moisture condition (*biasi*) is still widely adopted by the respondents and gets hold of about 80 and 77 per cent rice area amongst the tribal and non-tribal respondents, respectively (Table-3).

Table 3 : Method of sowing of rice

Method of sowing	Tribal (n=240)		Non-tribal (n=240)	
	Respondents (%)	Area (ha.)	Respondents (%)	Area (ha.)
Broadcasting	70.42	705.00	58.75	801.56
Line sowing	6.67	22.10	13.33	35.61
Transplanting	14.17	59.60	32.08	166.78
Dry sowing	25.42	92.30	9.53	40.82

found higher in case of non-tribal respondents. It was also evident from the data that most of the tribal and non-tribal respondents were using their own seed of rice and very few respondents were associated with institutional seed supply agencies. Only a few tribal and non-tribal respondents have adopted the seed treatment measures. Out of the respondents practicing seed treatment, local methods were more popular.

Transplanting of seedlings was found as the second important method, which occupied for 16 and 7 per cent of rice area amongst the non-tribal and tribal respondents, respectively. Another age-old method of rice sowing namely *khurra* (dry seeding) was found to be more popular amongst the tribal respondents than the non-tribal one.

5. Rice varieties and their preference

Rice was found as the major crop, therefore, cultivation of different rice varieties by the tribal and non-tribal respondents were studied and the findings are tabulated in Table-4. It was noted that most of the tribal farmers were growing

Out of the improved varieties, Kalinga was most popular in tribal respondents while, Swarna amongst the non-tribal respondents. IR-36 and Safri varieties were also found popular in both the categories of respondents. Only a few non-tribal respondents were growing scented rice varieties.

Table 4 : Area under important rice varieties

Rice Variety	Tribal (n=240)			Non-tribal (n=240)		
	Adopted by *	Area (acre) !	Rank #	Adopted by *	Area (acre) !	Rank #
Improved						
Mahamaya/ Kranti	5.83	37.60	X	11.67	93.30	V
IR-36	9.17	36.10	XI	24.58	177.10	II
Swarna	12.92	48.40	VII	37.08	368.70	I
Kalinga	20.83	79.30	IV	6.67	26.50	IX
Culture	3.33	21.70	XIII	7.92	47.70	VI
Other improved	6.25	33.40	IX	13.33	54.60	IV
Traditional	Total	261.36		767.81		
Safri	17.90	63.10	VI	21.30	111.80	III
Gurmatiya	22.50	102.30	III	11.30	35.50	VII
Assamchudi	31.70	162.60	I	5.40	27.60	XIII
Masuri	14.60	48.00	VIII	8.30	22.00	X
Scented	Total	375.99		196.84		
Dubraj	12.10	32.50	XII	7.10	31.50	VIII
Badshah/ Bisnu Bhog/ Bisni	25.80	130.70	II	5.40	28.10	XII
Other scented/ lical	27.90	78.50	V	6.70	20.60	XI
Total	241.65			80.12		

* reflects per cent respondents adopted the rice variety

! reflects area under the rice variety

reflects rank of a rice variety on the basis of area under it

traditional and scented rice varieties. Assamchudi was found as the most popular variety, cultivated by more than 31 per cent of the tribal respondents. Scented varieties like Bisnubhog/ Bisni/ Badsahbhog were the other important varieties grown by the tribal respondents. Majority of the non-tribal respondents were growing improved rice varieties.

In this way the findings reveals that a total of 42.77 per cent of the rice area of tribal respondents were under traditional rice varieties while, these varieties occupied only 18.84 per cent rice area amongst non-tribal respondents. Contrary to this, the area under improved rice varieties was 73.49 and 29.73 per cent amongst non-tribal and tribal respondents, respectively. The scented rice

varieties were cultivated in 27.49 and 7.67 per cent area of tribal and non-tribal respondents, respectively.

The significant value of rank correlation (r_s) indicates a clear difference in preference for rice varieties. The Kalinga variety may be adopted due to its early maturity and high suitability to abundant upland conditions of tribal areas. While the reason for adopting Swarna variety by the non-tribal respondents may be its good eating quality, market price and suitability to deep low land situations.

6. Use of fertilizers and manure

Fertilizer use is also known as one of the major factor for better crop production and productivity. The findings reveals (Table-5) a remarkable fact that in tribal areas, more than 38, 67 and 88 per cent of the respondents were not using nitrogen, phosphorus and potassium fertilizers, respectively. Further, those applying fertilizers were applying very low dose of potassium and phosphorus.

A good majority of non-tribal respondents were using fertilizers but here

Table 5 : Fertilizer use in rice farming

Fertilizer use	Tribal (n=240)		Non-tribal (n=240)	
	Frequency	Per cent	Frequency	Per cent
Nitrogen				
Nil	93	38.75	31	12.92
Up to 10.00	47	19.58	26	10.83
10.10 to 20.00	25	10.42	64	26.67
20.10 to 30.00	45	18.75	51	21.25
30.10 to 40.00	22	9.17	32	13.33
Above 40.00	08	3.33	36	15.00
Phosphorus				
Nil	162	37.50	87	36.25
Up to 5.00	31	12.92	31	12.92
5.10 to 10.00	19	7.92	22	9.17
10.10 to 20.00	17	7.08	44	18.33
20.10 to 30.00	09	3.75	39	16.25
Above 30.00	02	0.83	17	7.08
Potassium				
Nil	213	88.75	102	42.50
Up to 5.00	14	5.83	27	11.26
5.10 to 10.00	08	3.33	50	20.83
10.10 to 20.00	04	1.67	38	15.83
Above 20.00	01	0.42	23	9.58
Manure (cart per ha.)				
Nil	31	12.92	84	35.00
Up to 2.00	23	9.58	36	15.00
2.10 to 4.00	63	26.25	55	22.92
4.10 to 6.00	69	28.75	47	19.58
6.10 to 8.00	27	11.25	15	6.25
Above 8.00	27	11.25	03	1.25

too, the doses of potassium and phosphorus was found below the recommendation. The important reasons for using under dose of fertilizers by the tribal farmers may be high cost and poor economic capacity to purchase these chemical fertilizers.

Contrary to this, the consumption of manures in tribal areas was more than the non-tribal area. The findings shows that about 55 per cent tribal and 43 per cent of non-tribal respondents were using 2.1 to 6 cart load/ha of manure. The percentage of respondents using more than 8 cart load/ha of manure was 11.25 in tribal and 1.25 in case of non-tribal respondents. In non-tribal areas the cattle possession is decreasing and the cow dung is widely used for the preparation of fuel cake this might have reflected in decrease in preparation and application of manure in these areas.

7. Labour use in rice farming

The rice cultivation practices are grouped into five categories according to the requirement of human resources and the findings are presented in Table-6. It was found that, an average of 14.9 and 20.9 man day labour work was performed for the land preparation of rice in tribal and non-tribal areas, respectively. Out of which, the share

of hired labourers in this activity was 31.85 and 52.55 per cent among tribal and non-tribal respondents, respectively.

In comparison to tribal respondents, non-tribal respondents were using more man days in about all other activities of rice cultivation. In total, non-tribal respondents were devoting an average of 83 man days in comparison to 45.7 man days of tribal respondents for the cultivation of rice crop. The data further reveals that the share of hired labourers in non-tribal areas is significantly higher than the tribal area.

9. Adoption of pre and post-harvest rice technology

Some of the important pre and post harvest practices of rice cultivation were also studied and the findings are tabulated in Table-7. It was found that about 49 per cent of the tribal respondents were not using pest control measures. Of the tribal respondents 32.5 per cent were practicing only local method and 5.42 were using only improved methods whereas 13.33 per cent were using both local as well as improved methods of pest control. In case of non-tribal respondents the data shows that almost 75 per cent of respondents were using modern pest control measures.

Table 6 : Labour use pattern in rice farming (men days per ha)

Activity	Tribal (n=240)		Non-tribal (n=240)	
	Family labour	Hired labour	Family labour	Hired labour
Land preparation	11.30	3.60	13.70	7.20
Sowing	2.70	0.20	3.10	2.60
Weeding	3.40	4.20	6.80	12.90
Harvesting	6.60	7.20	3.20	15.30
Other inter-culturing operation	5.20	1.30	6.00	12.20
Total	29.20	16.50	32.80	50.20
Grand Total	45.70		83.00	

Table 7 : Adoption of pre and post-harvest technologies of rice farming

Technology	Tribal (n=240)		Non-tribal (n=240)	
	Frequency	Per cent	Frequency	Per cent
Pest control				
Not applied	117	48.75	36	15.00
Only local method	78	32.50	23	9.58
Only improved method	13	5.42	118	49.17
Local and improved method	32	13.33	63	26.25
Tool for harvest				
Local sickle	240	100.00	231	96.25
Improved sickle/ implement	00	0.00	09	3.75
Threshing				
Local	209	87.08	156	65.00
Improved	63	26.25	107	44.58
Storage				
Traditional kothi	165	68.75	157	65.42
Openly in a room	58	24.17	39	16.25
Gunny bags	26	10.83	61	25.42
Metal kotih/ Bin	08	3.33	25	10.42

Local made sickles were used by all of the tribal and 96.25 per cent of the non-tribal respondents. Similarly, majority of the respondents in both the categories were found to be using traditional/ local method of threshing, marketing and storage of rice crop. Some of the non-tribal respondents were using some improved implements for threshing their rice harvest. In all such activities the non-tribal respondents were

found to be ahead of tribal in adoption of modern practices.

10. Selected characteristics of tribal and non-tribal respondents

To assess the difference between tribal and non-tribal respondents with regards to their selected technological characteristics, 'Z' test was applied and the results are shown in Table-8. The data

Table 8 : Extent of difference between tribal and non-tribal for selected variables of rice farming

Variable	Tribal (n=240)		Non-tribal (n=240)		Mean difference	'Z' value
	Mean	SD	Mean	SD		
Cropping intensity (per cent)	107.30	12.96	118.20	21.94	- 10.89	6.62 **
Rice area (of % cropped area)	92.90	11.10	93.50	11.60	- 00.60	0.58
Area under modern rice varieties	36.20	37.60	73.50	42.29	- 37.30	10.21 **
Use of nitrogen (kg/ha)	11.20	8.43	27.09	14.81	- 15.89	14.44 **
Use of phosphorus (kg/ha)	2.20	2.95	13.00	10.10	- 10.80	15.92 **
Use of potassium (kg/ha)	0.90	1.08	2.96	3.12	- 2.06	9.71 **
Use of manure (carts/ha)	5.78	2.82	3.10	2.26	2.68	11.53 **

* Significant at 0.05 level of significance

** Significant at 0.01 level of significance

Table 9 : Relationship between selected variables with productivity of rice farming

Activity	Tribal (n=240)	Non-tribal (n=240)
	'r' value	'r' value
Size of land holding	- 0.014	0.140
Cropping intensity	0.224 **	0.220 **
Irrigation availability	0.595 **	0.370 **
Per cent rice area	- 0.084	0.160
Area under modern rice varieties	0.653 **	0.400 **
Application of Nitrogen	0.596 **	0.250 **
Application of Phosphorus	0.401 **	0.340 **
Application of Potassium	0.505 **	0.410 **
Use of manure	0.055	0.130
Seed treatment	0.139 *	0.210 **
Seed source	0.279 **	0.150 *
Plant protection	0.511 **	0.270 **
Agricultural implements	0.179 *	0.110

* Significant at 0.05 level of significance

** Significant at 0.01 level of significance

indicates significant difference between the tribal and non-tribal respondents for use of nitrogen, phosphorus, potassium and manure; cropping intensity; rice area under modern varieties and annual family income. While, proportion of rice area to cropped area has shown non-significant difference between the tribal and non-tribal respondents. In all these characteristics, use of manure was more intensive amongst the tribal respondents than non-tribals. All the remaining characteristics were having more intensity amongst the non-tribal respondents. This shows a clear disparity between both the categories of farmers.

12. Selected characteristics of respondents and productivity of rice

The data presented in Table-10 reveals that out of the total 13 variables studied; three variables namely size of land holding, area under rice and use of manures were not correlated with the productivity of

rice of the tribal respondents. While all other variables under study, were significantly correlated with the rice productivity amongst the tribal respondents. In case of non-tribal respondents use of manure and possession of agricultural implements were not correlated the productivity of rice. Remaining eleven variables were correlated with the productivity of rice.

Conclusion

The findings of the study clearly indicated that the tribal farmers of Chhattisgarh state are still lagging behind the non-tribal farmers in adoption of most of the improved technologies of rice farming. The non-adoption of latest rice farming technologies by tribal farmers results in to the lower productivity of most of the crops. Special efforts shall be made for popularizing the production technologies of rice in tribal areas.