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Farm activities adopted by Chhattisgarh state tribal and non-tribal farm families with regard to chemical fertilizers and productivity

MA Khan and JK ChauhanDOI: <https://doi.org/10.22271/chemi.2021.v9.i1b.11451>**Abstract**

The present study aims to study the adoption of various crop husbandry practices by the tribal and non-tribal farming communities. The findings of this investigation relied on the primary data collected from 480 farm families using stratified random sampling method. Rice was found as the major crop of both the tribal and non-tribal areas during wet season. Grasspea and chickpea were the popular rabi crops amongst the non-tribal areas, whereas the cultivation area of crops after rice in tribal areas was found quite less with low cropping intensity. Broadcasting method of rice cultivation is still popular in both the areas. The productivity levels of most popular crops in tribal areas are far behind than the non-tribal areas except wheat may be due to the poor plant nutrient management in such areas. Thus the significant difference in nutrient application can be overcome by imparting training and capacity building programs for all the farmers in general and tribal farmers in particular. The findings of this study further envisaged the need of intensive extension efforts and input support to the tribal farming communities for better adoption, enhanced productivity and profit maximization for equitable growth and development.

Keywords: Farm activities, nutrient management in rice, adoption of farm activities**Introduction**

Agriculture is the most important occupation of Chhattisgarh farmers. Rice is one of the important cereal crops of the world and forms the staple food for more than 50 per cent of the population and is known as "king of cereals". In India, Chhattisgarh state is considered as one of the centers of origin and evolution of rice and is blessed with enormous funds of rice variability. In India, Chhattisgarh is known as 'rice bowl' and consists of three agro-climatic zones, namely Chhattisgarh plains, Northern hills and Bastar plateau. Being endowed with the most favorable climate, the Chhattisgarh state has an excellent geographical center of diversity, particularly for rice. In Chhattisgarh, maximum area under rice cultivation is during kharif and contributes a sizeable share in national rice production and export as well. The state has a geographical area of 13.51 million hectares, of which 5.69 million hectares is under cultivation. Rice occupies an area of about 4 million hectares with an annual production of 7.10 million tons. Facts arising from past studies about the rice pertaining to Chhattisgarh are that of low productivity. The reason behind it may be several biotic and abiotic factors, since rice is not only important for the income of tribal farmers but also important for their food and nutritional security. The tribal population is spread in almost all the districts but their dominance is more in Northern hills and Bastar plateau zones. The Scheduled Tribe population of the state constitutes around 37 per cent of the total population and the population density is far better than the national average. The state's average productivity of most of the crops is behind that of the national average and productivity of tribal areas is much lower. The present study was undertaken with the aim to know the cultivation status of different crops along with the nutrient use for cultivation of the major crop *viz.* rice. The findings will be useful in strategic planning of equity and sustainable growth of both the tribal and non-tribal areas.

Materials and Methods

The present study was carried out in the Chhattisgarh State. Out of 156 total blocks, in order to have proper representation of the whole region, stratified sampling method was applied for the selection of blocks for the study, accordingly 10 per cent *i.e.* 16 blocks (8 tribal and 8 non

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-tribals) was considered. Amongst the total villages consisted in each selected block, a 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. Representative samples of 15 farm families were selected randomly for the study in proportion of existing farmers' categories from each of the selected village. 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 for the collection of primary data.

Results and Discussion

1. Cultivation of crops

The Chhattisgarh region mainly dominated with mono-cropping of rice in kharif season and only a few areas is under

sole crop of pulses and oilseeds. The Table 1 shows that in addition to rice, maize and Kodo-Kutki were the other important kharif crops grown by the tribal respondents. It was observed that maize was generally cultivated in homestead or backyard. Some kharif vegetable and pulses are also grown by more than 15 per cent of tribal respondents. Among non-tribal respondents in addition to rice other kharif crops were grown by majority of respondents in kharif season. Mustard is one of the major rabi crop grown in tribal areas. They were also cultivating niger, vegetables, and 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. This finding clearly indicates that rice is the most popular crop of both the category of respondents and other crops in kharif or rabi season has only limited scope.

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

Major crops	Tribal (n=240)		Non-tribal (n=240)	
	Frequency	Percentage	Frequency	Percentage
Kharif season				
Rice	240	100.0	240	100.0
Kodo-kutki	39	16.25	07	2.92
Maize	46	19.17	29	12.08
Soybean	08	3.33	41	17.08
Other crops (vegetables, pigeonpea, etc.)	36	15.00	58	24.17
Rabi season				
Mustard	37	15.42	11	4.58
Grasspea	15	6.25	83	34.58
Wheat	08	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

It is therefore required that all the possible extension efforts should be directed towards increasing the productivity potential of rice crop. In rabi season, grasspea is mainly cultivated as *utera* crop in rainfed situation, however, in irrigated areas, it is now rapidly replaced by chickpea and wheat crops. Therefore, the need of present time is to divert at least some rice area under other oilseed and pulse crops to cater the need of farm families.

2. Cropping intensity

The average cropping intensity of tribal respondents was only 107.3 per cent, which was highly comparable with the 118.23 per cent cropping intensity of non-tribal respondents (Table

2). The data reveals that the area under rabi crops were higher in non-tribal areas than the tribals' area. It was noted that more than 60 and 43 per cent tribal and non-tribal respondents respectively had less than 110 per cent cropping intensity. The percentage of respondents having about 175 per cent cropping intensity was only 1.25 among tribal respondents and 5.83 in case of non-tribal respondents. This low level of cropping intensity is one of the major hindrance in farmers' prosperity and to accelerate this situation adequate irrigation facilities is to be strengthened in both the tribal and non-tribal areas and also efficient water harvesting and available resources is required.

Table 2: Distribution of respondents according to the cropping intensity

Cropping intensity (%)	Tribal (n=240)		Non-tribal (n=240)	
	Frequency	Percentage	Frequency	Percentage
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%		118.23%	

3. Rice area according to sowing methods

The age old practice of ploughing the standing rice crop at 25-40 days after sowing under sufficient moisture condition

(*biasi*) is still widely adopted by the respondents and acquired about 80 and 77 per cent rice area amongst the tribal and non-tribal respondents, respectively (Table 3).

Table 3: Area under cultivation of rice crop according to sowing methods

Sowing methods	Tribal (n=240)		Non-tribal (n=240)	
	Area	%	Area	%
Broadcasting	705.0	80.20	801.56	76.72
Line Sowing	22.1	2.52	35.61	3.41
Transplanting	59.6	6.78	166.78	15.96
Dry seeding	92.3	10.50	40.82	3.91

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 still popular amongst the tribal respondents; they were adopting this method in more than 10 per cent of their total rice area.

Line sowing behind the plough or seed drills is comparatively less popular as reported by both the tribal and non-tribal respondents. In both the tribal and non-tribal areas, the cultivation of rice is under rainfed condition or in limited irrigation availability at later stage.

Under these circumstances adoption of sowing methods are highly uncertain and dependent on early rains, its quantity and

distribution. Earlier, the rainfall pattern of this region was favouring the broadcast *biasi* method. But now a days farmer are switching to other methods also. Those farmers who had assured water availability for rice crop are generally adopting transplanting method. Under poor early rains, the areas under dry seeding and line sowing increase.

4. Nutrient management in rice farming

Fertilizer use is also known as one of the major factor for better crop production and productivity. In this investigation (Table 4) the application of fertilizers in rice crop was studied. The findings reveals an remarkable fact that in tribal areas, still more than 9, 17 and 55 per cent of the respondents were not using nitrogen, phosphorus and potassium fertilizers, respectively in rice crop. In comparison to recommended dose, majority of respondents using fertilizers in this area are applying very low dose of potassium and phosphorus nutrients for rice farming. The situation of non-tribal farmers in comparison to tribal framers was found far better. A good majority of non-tribal respondents were applying fertilizers for plant nutrient management but the doses of major nutrients especially potassium and phosphorus was below the recommendations.

Table 4: Distribution of respondents according to nutrient use in rice farming

Nutrient use (ha ⁻¹)	Tribal (n=240)		Non-tribal (n=240)	
	Frequency	Percentage	Frequency	Percentage
Nitrogen through fertilizers				
Nil	23	9.58	3	1.25
Below 50 kg	117	48.75	30	12.50
51 – 60 kg	37	15.42	96	45.00
61 – 70 kg	51	21.25	51	27.92
Above 70 kg	12	5.00	32	13.33
Phosphorus through fertilizers				
Nil	42	17.50	7	2.92
Up to 20 kg	131	54.58	31	12.92
21 – 30 kg	42	17.50	74	30.83
31 – 40 kg	17	7.08	88	36.67
Above 40 kg	08	3.33	40	16.66
Potassium through fertilizers				
Nil	132	55.00	32	13.33
Up to 10 kg	81	33.75	49	20.42
11 – 20 kg	23	9.58	121	50.42
Above 20 kg	04	1.67	38	15.83
Manure (cart ha⁻¹)				
Nil	31	12.92	84	35.00
Up to 2.0	23	9.58	36	15.00
2.1 – 4.0	63	26.25	55	22.92
4.1 – 6.0	69	28.75	47	19.58
6.1 – 8.0	27	11.25	15	6.25
Above 8.0	27	11.25	03	1.25

Contrary to this, the consumption of manures in tribal areas was more than the non-tribal areas. 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 respectively. 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. The important reasons for using under doses of fertilizers by the tribal farmers may be their negative attitude, high cost and poor economic capacity to purchase these chemical fertilizers.

The fuel wood in tribal areas is generally collected from their adjoining forests hence, cattle dung etc. were unused for preparing manure, which is applied in the fields. In non-tribal areas the cattle possession is decreasing and the cow dung is

widely used for the preparation of fuel cake hence preparation of manure is rapidly decreasing.

5. Productivity of major crops

The productivity level of major crops grown by the respondents is presented in Table 5. Rice, cultivated by all the respondents in tribal as well as non-tribal areas had an average of 18.1 and 26.3 q ha⁻¹ productivity in tribal and non-tribal areas, respectively. Kodo-kutki and maize were the other important crops of tribal areas and had 4.7 and 16.4 q ha⁻¹ productivity. In case of non-tribal respondents, 12.1 and 17.1 per cent were cultivated maize and soybean, respectively and the yields of these crops were recorded to be the 25.7 and 10.1 q ha⁻¹, respectively. It was also noted that the maximum

productivity of rice (52 q ha⁻¹) and all other Kharif crops in non-tribal areas was significantly higher than the average productivity. Similarly the gap between maximum and average productivity of crops was noticed significant in tribal areas also.

During rabi season mustard was the most popular crop among tribal respondents. Grasspea and chickpea were the important

crops among the non-tribal respondents cultivated by more than 34 and 25 per cent respondents, respectively. The average productivity of mustard, linseed were at par in tribal and non tribal respondents. The yield of wheat, kodo-kutki and mustard was higher in tribal areas in comparison to non-tribal areas. The productivity of remaining crops was more in non-tribal areas than the tribal areas.

Table 5: Productivity level of major crops

Crops	Tribal (n=240)				Non-tribal (n=240)			
	Resp-ondent (%)	Productivity (q ha ⁻¹)			Resp-ondent (%)	Productivity (q ha ⁻¹)		
		Min.	Max.	Average		Min.	Max.	Average
<i>Kharif season</i>								
Rice	100.0	7.20	34.4	18.1	100.0	9.0	52.0	26.3
Kodo-kutki	16.25	2.60	6.4	4.7	2.9	3.8	8.0	4.4
Maize	19.17	12.5	22.0	16.4	12.1	8.5	38.0	25.7
Soybean	3.33	2.5	10.9	8.5	17.1	5.0	16.0	10.1
<i>Rabi season</i>								
Mustard	15.42	2.5	10.0	6.0	4.5	2.4	8.2	5.35
Grasspea	6.25	2.8	5.5	3.0	34.58	2.6	8.0	4.41
Wheat	3.33	6.3	22.5	14.9	12.92	3.5	18.5	12.84
Chickpea	5.42	2.6	8.8	6.3	25.0	2.5	12.5	7.54
Lentil	3.75	1.6	4.8	3.1	17.5	2.2	10.5	3.93
Mung/Urid	7.92	2.3	8.6	2.8	14.17	1.85	11.6	4.42
Linseed	4.17	1.2	6.3	3.0	9.17	2.12	7.7	3.03

To assess the difference between the productivity of major crops in tribal and non-tribal respondents, 'Z' test was applied and the results are given in Table 6. The findings revealed that rice, chickpea, grasspea were having significant difference at

1 percent level of probability while, no significant difference of productivity of other crops between tribal and non-tribal respondents were observed.

Table 6: Difference between tribal and non-tribal farmers with regards to productivity of important crops

Crops	Tribal (n=240)			Non-Tribal (n=240)			'Z' Value
	Respondent (%)	Mean	SD	Respondent (%)	Mean	SD	
Rice	100.0	18.1	3.50	100.0	26.3	7.81	15.02**
Maize	19.17	16.4	2.48	12.09	25.7	5.31	2.10
Kodo-kutki	16.25	4.7	0.58	2.92	4.4	1.13	0.69
Soybean	3.33	8.5	1.88	17.08	10.1	3.13	1.94
Chickpea	5.42	6.3	1.03	25.00	7.5	2.06	3.07**
Wheat	3.33	14.9	4.44	12.92	12.8	2.28	1.71
Grasspea	6.25	3.0	0.64	34.58	4.4	1.21	6.60**
Mustard	15.42	6.0	1.60	4.58	5.4	1.50	1.14

** Significant at 0.01 level

The productivity of wheat crop in tribal areas is higher than the non-tribal areas may be due to long winter spell and sufficient residual moisture in these areas favours the better growth and yield of wheat. The productivity of other crops in tribal areas is lower than the non-tribal areas may be due to more adoption of modern agricultural practices by the non-tribal farmers.

Conclusion

The findings of this investigation reflect that agriculture being the most important rural enterprise is widely adopted by the people of both the tribal and non tribal areas. During the rainy season rice was found as the most popular crop that too with or without irrigation availability. Due to the wide variability in agro-ecological and climatic situations in the state, the methods of cultivation of crops and adoption of production technologies were also differ from community to community and area to area. The general hypothesis looks true from the results of this study about the poor productivity level of most of the crops in tribal areas as compared to non tribal areas. This may be because of low application of fertilizers and other recommended technologies by the tribal farmers. In this

connection it may be conclude that separate technology development and technology transfer strategy is needed for both the areas according to available resources and biotic conditions.

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