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## Popular farming systems in northern hills of Chhattisgarh state: A survey based appraisal of prosperity

Sunil Narbaria, MA Khan, ML Sharma and Subodh Pradhan

### Abstract

The present study was carried out during 2015-16 in the periphery of Northern Hills Agro-climatic zone of Chhattisgarh state. This study aims to assess the information on popular farming systems and their profitability. This study was conducted randomly selected 20 villages identified from all the 10 blocks of all the five districts in this zone. The sample comprised of 300 farm families. The data was collected through personal interview using interview schedule. The collected data were analyzed with the help of suitable statistical methods. The finding shows that Rice-potato+vegetable-fellow and rice-maize-fellow were the most popular cropping systems of irrigated area. Rice-fellow-fellow was mostly adopted under rainfed situation. The profitability of rice-potato+vegetable-fellow cropping system was highest followed by sugarcane-fellow cropping system from irrigated area. Rice-mung/urid-fellow cropping system provides highest profitability from rainfed situation.

**Keywords:** Farming system, cropping system, profitability and agro-climatic zone

### 1. Introduction

A farming system is the result of complex interactions among a number of inter-dependent components, where an individual farmer allocates certain quantities and qualities of four factors of production, namely land, labour, capital and management to which he has access (Mahapatra, 1994) [4]. Farming systems research is considered a powerful tool for natural and human resource management in developing countries such as India. This is a multidisciplinary whole-farm approach and very effective in solving the problems of small and marginal farmers. The approach aims at increasing income and employment from small-holdings by integrating various farm enterprises and recycling crop residues and by-products within the farm itself (Behera and Mahapatra, 1999 and Singh *et al.*, 2006) [1, 5]. The crop and cropping system based perspective of research needs to make way for farming systems based research conducted in a holistic manner for the sound management of available resources by small farmers (Jha, 2003) [3]. Under the gradual shrinking of land holding, it is necessary to integrate land based enterprises like fishery, poultry, duckery, apiary, field and horticultural crops, etc. within the bio-physical and socio-economic environment of the farmers to make farming more profitable and dependable (Behera *et al.*, 2004) [2].

### 2. Material and methods

The present study was carried out in Northern Hills of Chhattisgarh state during the years 2014-15 and 2015-16. All the five districts in the zone, Surguja, Korja, Surajpur, Balrampur and Jaspur were undertaken for the study. Two Block from each selected district were selected randomly. In this way a total of 10 blocks (2 X 5 = 10) were taken for this study. From each selected block, 2 villages (Total 2 X 10 = 20) were selected randomly for the selection of respondents for this investigation. From each selected village, 15 farmers were selected randomly in this way, a total of 300 farmers (Total 20 X 15 = 300) were considered as respondent to respond as per the schedule design for the study. The interview schedule was designed on the basis of objectives and independent and dependent variables considered for this investigation. To facilitate the respondents, the interview schedule was framed in "Hindi". Each question was thoroughly examined and discussed with the experts before finalizing the interview schedule. Adequate precautions and care were taken into consideration to formulate the questions in a manner that they were well understood by the respondents and would find it easier to respond. Before using prepared interview schedule for collection of data it was pre-tested by 20 non-sample respondents and also checked its reliability and validity. On the basis of experience gained in pre-testing, the necessary modifications and suggestions were

incorporated before giving a final touch to interview schedule. The collected data were analyzed with the help of suitable statistical methods like Frequency, Percentage, Benefit Cost Ratio, etc.

### 3. Results and Discussion

#### 3.1 Existing farming system adopted by the respondents

Farming system is a resource management activity to achieve economic and sustained production to meet diverse requirement of farm household while preserving the resource base and maintaining high environmental quality. The findings regarding farming systems adopted by the respondents are compiled and presented in Table 01. It was observed that most (94.67%) of the respondents were adopted

cereal base farming system, followed by 3.33 percent of respondents adopted sugarcane based farming system and 1.33 percent of the respondents adopted dairy based farming system. While, only 0.67 percent of the farmers were adopted pulse based farming system. No respondent from the study area were reported about the adoption of oilseed based and pasture based farming system.

The maximum number of respondents were adopted cereal based farming system, may be because of Chhattisgarh is occupied first position in area and production among all crops and is also considered as staple food of majority of people in this state in general and in Northern Hills in particular. The topography and field situation is also favors for cultivation of rice in the area.

**Table 1:** Distribution of respondents according to their involvement in different farming system.

S. No	Farming system	Frequency	Percentage
1	Cereal Based	284	94.67
2	Pulse Based	02	0.67
3	Oilseed Based	0	0.00
4	Sugarcane Based	10	3.33
5	Dairy Based	04	1.33
6	Pasture Based	0	0.00

#### 3.2 Profitability gained from different cropping systems

The findings towards the profit fetched from different cropping systems followed under irrigated and rainfed situations are compiled in Table 02. The data reveals that half of the respondents received more than Rs. 1 lakh/ha profit from rice-wheat-fallow cropping system under irrigated situation. Rs. 0.85 lakh to Rs.1 lakh/ha profit were received by 30 and 20 percent of the respondents, respectively. Regarding profitability of rice-maize-fallow system, majority (51.72%) of the respondents got above Rs. 65000/ha, followed by 34.49 percent of the respondents received up to Rs. 60000/ha and about 14 percent of the respondents got Rs. 600001 to 65000/ha. The data pertaining to profitability of rice-potato+vegetable-fallow cropping system, majority of the respondents (46.67%) got more than Rs. 3 lakh/ha, followed by 40 percent practicing respondents earned up to Rs. 2.5 lakh/ha.

The findings on profitability of rice-chickpea-fallow system shows that most of the respondents received more than Rs. 75000/ha, followed by 33.33 percent respondents got up to Rs. 70000/ha and 11.11 percent of the practicing respondents earned Rs. 70001 to 75000/ha. The data pertaining to the profitability of rice-arhar(bunds)-fallow cropping system shows that majority of the respondents (46.66%) got Rs. 90001 to Rs. 95000/ha, followed by 26.67 percent respondents received up to Rs. 90000 and 26.67 percent of the respondents got more than Rs. 95000/ha profit.

The findings regarding profitability of rice-fallow-fallow cropping system followed in cereal based farming system under rainfed situation indicate that most of the respondents received Rs. 60001 to 65000/ha profit, followed by 21.75 percent of the respondents got up to Rs. 45001 to 55000/ha and about 21 percent of the practicing respondents received up to Rs. 45000/ha profit. Regarding profitability of rice-mung/urid-fallow cropping system, the findings indicated that majority of the respondents (46.16%) earned up to Rs. 60000/ha, followed by 38.46 percent of the respondents received more than Rs. 65000 and 15.38 percent of the respondents got Rs. 60001 to 65000/ha.

The data consisting the profitability of sugarcane-vegetable

cropping system under sugarcane based farming system shows that majority of the respondents (71.42%) received Rs. 1.2 to 1.4 lakh/ha and remaining 14.29 percent of the respondents (each) got more than Rs. 1.4 lakh/ha and up to Rs. 1.2 lakh/ha. The findings regarding profitability of sugarcane-fallow cropping system revealed that majority of the respondents (75%) received Rs. 1.2 to 1.4 lakh/ha, followed by 25 percent of the respondents got up to Rs. 1.2 lakh and none of the respondent received more than Rs. 1.4 lakh/ha profit.

The data on profitability of arhar-maize (summer) followed in pulse based farming system shows that both the two respondents received up to Rs. 1.25 lakh/ha.

#### 3.3 Net returns from various farming systems

The net returns from each of the existing cropping system was worked out with the help of per ha net income or benefit cost ratio for each cropping system and the results are compiled in Table 03. It is clear from the findings that the respondents got higher net return of Rs. 269082/ha through rice-potato+vegetable-fallow cropping system with 4.90 benefit cost ratio. Rs. 93096/ha was reported as net return from rice+arhar-fallow cropping system (BC ratio 3.95), Rs. 126754 from sugarcane-fallow cropping system (BC ratio 3.86), Rs. 97895/ha through rice-wheat-fallow cropping system (BC ratio 3.17) and Rs. 73584/ha was fetched from rice-chickpea-fallow cropping system with 3.14 BC ratio. Regarding lowest net returns from existing cropping systems, the data shows that respondents obtained lowest net return of Rs. 63480/ha by adopting rice-maize-fallow cropping system (BC ratio 2.33), followed by Rs. 64884/ha through rice-mung/urid cropping system (BC ratio 2.65), Rs. 132081/ha from sugarcane-vegetable cropping system (BC ratio 2.99), Rs. 107254/ha through arhar-maize-fallow cropping system (BC ratio 3.04) and Rs. 50292/ha by adopting rice-fallow-fallow cropping system (BC ratio 3.13).

The result shows that the respondents got maximum net return from rice-potato+vegetable-fallow cropping system may be because of potato got favorable climate gives higher yield in the study area. The farmers who adopted this cropping system used sufficient fertilizers with enough quantity of manures.

**Table 2:** Distribution of respondents according to profitability of different prevailing cropping systems

Cropping System	Profitability (Rs./ha)	Frequency	Percentage
1. Cereal based (n=284)			
A. Irrigated (n=93)			
Rice-Wheat- Fallow (n=10)	Up to 85000	02	20.00
	85001 to 100000	03	30.00
	> 100000	05	50.00
Rice-Mize-Fallow (n=29)	Up to 60000	10	34.49
	60001 to 65000	04	13.79
	>65000	15	51.72
Rice-Potato+Vegetable-Fallow (n=30)	Up to 250000	12	40.00
	250001 to 300000	04	13.33
	> 300000	14	46.67
Rice-Chickpea-Fallow (n=9)	Up to 70000	03	33.33
	70001 to 75000	01	11.11
	> 75000	05	55.56
Rice+Arhar (Bunds)- Fallow (n=15)	Up to 90000	04	26.67
	90001 to 95000	07	46.66
	>95000	04	26.67
B. Rainfed (n=191)			
Rice-Fallow-Fallow (n=178)	Up to 45000	37	20.79
	45001 to 55000	38	21.35
	>55000	103	57.86
Rice-Mung/Urid-Fallow (n=13)	Up to 60000	06	46.16
	60001 to 65000	02	15.38
	> 65000	05	38.46
2. Sugarcane based (n=10)			
Sugarcane-Vegetable (n=7)	Up to 120000	01	14.29
	120001 to 140000	05	71.42
	>140000	01	14.29
Sugarcane-Fallow (n=3)	Up to 120000	01	25.00
	120001 to 140000	02	75.00
3. Pulses based (n=2)			
Arhar-Maize (summer) (n=2)	Up to 125000	02	100
	> 125000	0	0.00

**Table 3:** Average returns from existing cropping systems adopted under different farming system

Cropping System	Average System Productivity (REY q/ha)	Income (Rs/ha)	Cost (Rs/ha)	Net Income (Rs/ha)	Average B:C Ratio
(A) Cereal Based (n=284)					
(A1) Irrigated (n=93)					
Rice-Wheat-Fallow	45.98	128752	30858	97895	3.17
Rice-Maize-Fallow	32.41	90759	27279	63480	2.33
Rice-Potato+Vegetable	115.70	323957	54876	269082	4.90
Rice-Chickpea-Fallow	64.70	181153	23411	73584	3.14
Rice+Arhar-Fallow*	41.68	116693	23597	93096	3.95
(A2) Rainfed (n=191)					
Rice-Fallow-Fallow	23.72	66413	16122	50292	3.13
Rice-Mung/Urid-Fallow	31.9	89329	24445	64884	2.65
(B) Sugarcane based (n=10)					
Sugarcane -Vegetable	62.93	176204	44123	132081	2.99
Sugarcane- fallow	57	159600	32846	126754	3.86
(C) Pulse Based (n=2)					
Arhar-Maize-Fallow	50.925	142590	35336	107254	3.04

\*Arhar cultivation in bunds

**4. Conclusion**

From the above research findings it can be concluded that Rice-potato+vegetable-fallow and rice-maize-fallow were the most popular cropping systems of irrigated areas. Rice-fallow-fallow cropping system was mostly adopted under rainfed situation. Sugarcane-vegetable and sugarcane-fallow cropping systems were mostly adopted under sugarcane based farming system. Pulse based farming system of study area comprises of arhar-maize (summer) cropping system. The system profitability of rice-potato+vegetable-fallow cropping

system was highest followed by sugarcane-vegetable cropping system from irrigated areas. Rice-mung/urid-fallow cropping system provides highest profitability from rainfed areas. On the basis of findings and observations sought from various stakeholders during the course of investigation the following strategies are suggested, water harvesting practices should be adopted for supply of irrigation for second crop, replacement of traditional varieties with high yielding short and medium duration varieties, cultivation of arhar, soybean as intercrops, effective information and communication management of

value chain management, input supply, promotion of integrated farming system, improve market intelligence and remunerative crops or enterprise should be adopted to increase the productivity and enhancing the profit from per unit area or input investment.

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