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A study on Resource use Efficiency of Production and Marketing of Chickpea in Banda District of Bundelkhand Zone in Uttar Pradesh, India

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ABSTRACT

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In the present paper, an attempt has been made to examine various chickpea production in different categories of the farmers. A study on "Production & marketing of chickpea in Banda district of Bundelkhand zone in Uttar Pradesh: An economic analysis" was conducted for analysis the cost of input-output in chickpea cultivation. Hundred (100) sample farmers (marginal-28, small-34 & medium-38) were interviewed from few village of Baberu block of Banda district. Data were analyzed and found that average land holding size was 1.95 hectare and cropping intensity was 187.18% on an average cost of cultivation per hectare was found to be Rs. 34353.35. The gross income and net income were found to be Rs. 55172.70 and Rs. 22666.81 per hectare on overall farm respectively. The input-output ration was found to be 1:1.66 on cost C₃ chickpea cultivation in the study was characterized by decreasing return to scale.

Introduction

Chickpea (*Cicer arietinum* L.) is one of the major pulse crops grown in India. Chickpea has the richest, cheapest and easiest source of best quality proteins and fats. Chickpea is also a good source of vitamins (especially B vitamins) and minerals like potassium and phosphorus. Agriculture continues to be the backbone of Indian economy, which has a significant history. The share of agriculture and allied sectors in India's GDP has declined

to 17.32 per cent in 2016-17 due to shift from traditional agrarian economy to industry and service sectors. Despite a decline in the sector's contribution to GDP, the production of food grains has increased from 255.4 million tonnes in 2012-13 to 275 million tonnes in 2017-18.

The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth. Still, agriculture is demographically the broadest

economic sector and plays a significant role in the overall socio-economic fabric of India. Agriculture, with its allied sectors, is the largest source of livelihoods in India. 70 percent of its rural households still depend primarily on agriculture for their livelihood, with 82 percent of farmer being small and marginal (AFO 2017-18).

Chickpea is the 4th largest grain-legume crop in the world, with a total production of 9.20 mt from an area of 11.20 M ha and productivity of 0.89 T ha (FAO, STAT 2011). Over 90 per cent of the global chickpea is produced and consumed in Asia. Chickpea is a highly nutritious pulse and places third in the important list of the food legumes that are cultivated throughout the world.

In India, the total food production in 2013-14 was about 257.4 million tones out of which only 19.3 million tones was contributed by pulses. The production of cereals increase by 460 per cent since 1950-51 but the production of pulses in the country has increased only 178 per cent. There is acute shortage of pulses in the country.

Pulses are grown across the country with highest share coming from Madhya Pradesh (24 per cent), Uttar Pradesh (16 per cent), Maharashtra (14 per cent), Andhra Pradesh (10 per cent), Karnataka (7 per cent) followed by Rajasthan (6 per cent), which together accounted about 77 per cent of the total pulse production, while the remaining 23 per cent contributed by Gujarat, Chhattisgarh, Bihar, Orissa and Jharkhand. In Uttar Pradesh total chickpea production 0.73 million tonnes from 0.6 million hectare area with 1217 kg/ha productivity in year 2012-2013 (NFSM 2014).

Bundelkhand region divided into two divisions i.e. Chitrakoot and Jhansi. In Bundelkhand total chickpea production and

area contributed by Chitrakoot division 45794 Metric tonnes production from 40971 hectare with 2.36 kg/ha productivity and Jhansi division 39235 metric tonnes production from 4800.2 hectare area with 7.14 kg/ha in year 2014-2015 (Zila Sankhikiya Patrika 2016).

Most of the people in the country satisfy their appetite requirements by consuming pulses. Chickpea is the most largely produced pulse crop in India accounting to a share of 40 per cent of the total pulse crops produced in India and that makes it the leading chickpea producing country in the world.

Chickpea is one of the important pulse crops of Banda district of Uttar Pradesh. Chickpea occupied 92759 hectare of area and 13190 metric tones production with 1.4 quintal per hectare productivity. (Zila Sankhyaki Patrika, 2016). Chickpea seems to have lucrative pulse crop of Banda district of Uttar Pradesh. No scientific study has been so far conducted on economics aspects of this crop.

Therefore the proposed study entitled “Production and marketing of Chickpea in Banda district of Bundelkhand Zone in Uttar Pradesh: An Economic analysis” assume special significance. The main objective of the study includes to work out cost and return of chickpea production on different size of sample farms. And also to work out resource use efficiency in chickpea production in different size of sample farms.

Materials and Methods

Sampling technique

The purposive and random sampling techniques were used to select, village and farmers. The district Banda was selected purposively. The sampling technique were sub divided into following stages:

Selection of block
Selection of village
Selection of farmers

Selection of block

At first a list of all blocks of Bandadistrict of Bundelkhand zone in Uttar Pradesh along with acreage in chickpea cultivation were prepared and arranged in descending order, the namely “Baberu” block having highest area in chickpea was selected purposively for this study.

Selection of Village

A list of all villages following “Baberu” block was prepared and arranged in ascending order to take area covered under chickpea crop and 5(Five) village selected randomly from this list.

Selection of farmers

Three stage satisfied purposive cum random sampling technique was used to select the district, block, village and farmers. Banda district of eastern U.P. and Baberu block of district Banda were selected purposively. A list of all the chickpea growing villages of selected block was prepared and five villages were selected randomly.

A list of all the chickpea cultivators of each selected village was prepared and arranged in ascending order under three categories i.e.

Marginal (below 1 ha.)

Small (1-2 ha.)

Medium (2-4 ha. and above)

Following proportionate random sampling technique a sample of 100 farmers viz. marginal -28, small-34 and medium -38 were selected for the purpose of the study.

Method of Enquiry

The primary data information was collected by survey method through personal interview. The data were selected on well structure & tested schedule but secondary information were option from the tehsil/village and district level official records.

Period of enquiry

The primary data were collected for the period of one year i.e. Agriculture year 2018-19.

Analytical tools

Tabular analysis was used for analysis of data weighted average, cropping intensity and cost benefit ration worked out with the following formula.

$$\text{Weighted Average} \quad \text{WA} = \frac{\sum W_i X_i}{\sum W_i}$$

Where,

WA = Weighted Average Xi = Variable

Wi = Weights of variable

$$\text{Cropping intensity} \quad \text{C.I.} = \frac{\text{Total Cropped Area}}{\text{Net Cultivated Area}} \times 100$$

Where,

C. I. = cropping intensity

Results and Discussion

Structure of farms

Farm structure includes the average size of holding, cropping intensity, cropping pattern and investment on farm assets.

Distribution of farm and their cultivated area under different size groups of farms is presented in table. 1. It is clear from the

table.1 that net cultivated area of sample farms constituted 11.63%, 28.58% and 59.79% chickpea under marginal, small and medium farms respectively.

The average size of land holding of marginal, small and medium farms comes to be 0.5, 1.29 and 3.42 hectare respectively. On an average holding size was estimated to be 1.18 hectare.

Size of holding

The average size of holding and cropping is the presented in the table 1. It is depicted from the table that average size of holding the increasing trend with increase the size of farmers. The holding size of marginal, small and medium farms, were found to be 0.81, 1.64 and 3.07 hectare respectively.

Cropping intensity

Cropping intensity it has been computed for all size group of farms and is presented table 2. The maximum cropping intensity was observed as 206.17 at marginal size group of sample farms followed by small (193.90) and medium 180.13 size group of farms overall cropping intensity in the area was found to be 187.18 percent.

Cropping Pattern

Cropping pattern is the proportion of area under different crops at a point of time. It is an important factor to decide the level of investment for different input on farm and income of farmer based on resource availability and climatic condition.

Table.1 Average size of land holding under different size group of sample farms

S. No.	Size of Group Farms	No. of sample farms	Net cultivated area	Averages size of land holding
1	Marginal Farms (below 1 ha)	28	22.68 (11.63)	0.81
2	Small Farms (1-2 ha)	34	55.76 (28.58)	1.64
3	Medium Farms (2-4 ha & above)	38	116.66 (59.79)	3.07
Total		100	195.10 (100)	1.95

Table.2 Cropping intensity of different size group of sample farms (%)

S.No.	Size group of farms	No. of farms	Net cultivated area (ha)	Gross Cropped area (ha)	Cropping intensity
1.	Marginal	28	0.81	1.67	206.17
2.	Small	34	1.64	3.18	193.90
3.	Medium	38	3.07	5.53	180.13
Average		100	100	3.65	187.18

Table.3 Cropping Pattern under different size group of sample farms (Area in ha and %)

S. No.	Name of Crops	Average size of sample farms						Overall average	
		Marginal		Small		Medium		Area	%
		Area	%	Area	%	Area	%		
A. Kharif									
1	Til	0.26	15.77	0.49	15.49	0.75	13.61	0.52	14.45
2	Paddy	0.19	11.09	0.32	9.75	0.64	11.63	0.40	11.00
3	Jwar	0.16	9.71	0.34	10.79	0.37	6.66	0.30	8.27
4	Arhar	0.05	3.18	0.13	4.20	0.43	7.70	0.22	6.09
5	Bajra	0.08	4.86	0.15	4.83	0.27	4.83	0.18	4.83
6	Chari	0.02	0.84	0.08	2.33	0.05	0.96	0.05	1.35
7	Maize	0.02	1.26	0.02	0.82	0.13	2.39	0.27	1.78
	Sub-total	0.78	46.70	1.53	48.20	2.64	47.78	1.74	47.77
B. Rabi									
1	Wheat	0.29	17.63	0.57	17.98	1.08	19.52	0.69	18.82
2	Chickpea	0.28	16.97	0.40	12.59	0.56	10.07	0.42	11.70
3	Mustard	0.06	3.60	0.18	5.74	0.32	5.82	0.20	5.51
4	Potato	0.01	0.24	0.01	0.35	0.01	0.24	0.01	0.27
5	Barley	0.05	2.94	0.10	3.12	0.22	3.85	3.52	0.13
6	Pea	00	-	0.01	0.32	0.03	0.60	0.02	0.44
7	Lentil	0.08	4.98	0.22	6.97	0.35	6.31	0.23	6.34
8	Barseem	00	-	0.01	0.44	0.04	0.71	0.02	0.54
	Sub-total	0.77	46.34	1.51	47.51	2.61	47.12	1.72	47.13
C. Zaid									
1	Moong	0.04	1.92	0.08	2.49	0.16	2.95	0.10	2.68
2	Chari	0.08	5.04	0.06	1.80	0.12	2.15	0.09	2.42
	Sub-total	0.12	6.95	0.14	4.29	0.28	5.10	0.19	5.10
Gran Total(A+B+C)		1.67	100	3.18	100	5.53	100	3.65	100

Figure in parentheses indicate the percentage to the total cropped area

Table.4 Per farm average investment of assets on different size group of sample farms (Rs.).

S. No.	Particulars	Size of farms			
		Marginal (28)	Small (34)	Medium (38)	Overall average
1.	Buildings	178321.40 (72.99)	352968.40 (69.20)	352968.40 (53.55)	279116.00 (61.17)
2.	Live stock	40378.57 (16.95)	67063.97 (16.38)	59592.11 (9.04)	56752.75 (12.44)
3.	Machinery & Implement	23955.79 (10.06)	59051.56 (14.42)	246510.70 (37.40)	120459.20 (26.40)
	Grand total	238155.80 (100)	409403.80 (100)	659071.20 (100)	456327.90 (100)

Table.5 Cost of cultivation per hectare of chickpea and different size of farms (Rs.)

S. No.	Particulars	Size group of farms							
		Marginal		Small		Medium		Overall average	
		Rs.	%	Rs.	%	Rs.	%	Rs.	%
A.	Cost of expenditure								
1.	Human Labour	7913.29	25.03	8629.41	24.71	9070.85	25.30	8596.64	25.02
a.	Family Labour	5374.71	17.00	4704.38	13.47	4422.38	12.33	4784.91	13.93
b.	Hired Labour	2538.58	8.03	3925.03	11.24	4648.47	12.96	3811.73	11.10
2.	Machinery Power	6836.74	21.62	8261.03	23.65	8379.39	23.37	7907.21	23.02
3.	Seed and showing	3674.71	11.62	3753.00	10.75	3759.03	10.48	3733.37	10.87
4.	Manure and fertilizer	1373.19	4.34	1849.71	5.30	1948.72	5.43	1753.91	5.11
5.	Irrigation	734.19	2.32	877.85	2.51	999.90	2.79	884.01	2.57
6.	Total working capital	15157.40	47.94	18666.62	53.45	19735.51	55.04	18090.22	52.66
7.	Interest on working capital	606.30	1.92	746.66	2.14	789.42	2.20	732.61	2.11
8.	Rental value of land	7500.00	23.72	7500.00	21.47	7500.00	20.92	7500.00	21.83
9.	Interest on fixed capital	106.22	0.34	132.09	0.38	149.82	0.42	131.58	0.38
10.	Sub Total	28744.63	90.91	31749.76	90.91	32597.13	90.91	31290.32	90.91
11.	Managerial Cost@10% of sub-total	2874.46	9.09	3174.98	9.09	3259.71	9.09	3123.03	9.09
	Grand Total	31619.09	100	34924.74	100	35856.84	100	34353.35	100

Figures in parenthesis indicate percentage to the grand total

Table.6 Measures of per hectare cost and return of chickpea (Rs.)

S. No.	Particulars		Size Group of Farms			Overall Average
			Marginal	Small	Medium	
B.	Income					
1	Cost A1/A2		15157.4	18666.62	19735.51	18090.22
2	Cost B1		15263.62	18798.70	19885.33	18221.80
3	Cost B2		22763.62	26298.70	27385.33	25721.80
4	Cost C1		20638.33	23503.092	24307.70	23006.71
5	Cost C2		28744.63	31749.76	32597.13	31230.32
6	Cost C3		31619.09	34924.74	35856.84	34353.35
7	Yield (q/ha.)	(a.) Main Product	12.01	12.30	12.41	12.26
		(b.) By-product	5.59	6.30	6.45	6.16
8	Gross Income (Rs.)	(a.) Main Product	54045.00	55350.00	55845.00	55172.70
		(b.) By Product	1677.00	1890.00	1935.00	1847.46
		(c.) Total	55722.00	57240.00	57780.00	57020.16
9	Net Return over Cost C3		24102.91	22315.26	21923.16	22666.81
10	Family income		32958.38	30941.29	30394.67	31298.36
11	Farm Business Income		40564.60	38573.38	38044.49	38929.94
12	Farm Investment Income		31709.13	29947.35	29572.98	30298.39
13	Cost of Production (q/ha.)		2632.73	2938.41	2889.35	2802.07
14	Benefit: Cost (B:C) Ratio	(a) . On the Basis of Cost A1	1:3.68	1:3.07	1:2.93	1:3.18
		(b). On the Basis of Cost B1	1:3.65	1:3.04	1:2.91	1:3.16
		(c). On the Basis of Cost B2	1:2.45	1:2.18	1:2.11	1:2.22
		(d). On the Basis of Cost C1	1:1.98	1:1.85	1:1.82	1:1.87
		(e). On the Basis of Cost C2	1:1.94	1:1.80	1:1.71	1:1.83
		(f). On the Basis of Cost C3	1:1.76	1:1.64	1:1.61	1:1.66

Table.6 Production elasticity of chickpea crop on different size group of farm

Size of group	Production Elasticity				Sum of Elasticity	R ²
	X ₁	X ₂	X ₃	X ₄		
Marginal	0.251398* (0.093867)	0.410148** (0.054458)	0.101294 (0.354494)	0.092214 (0.154459)	0.855054	0.895459
Small	0.213173 (0.126288)	0.438785** (0.058761)	0.125629 (0.289718)	0.76875 (0.112481)	0.854462	0.844739
Medium	0.177716 (0.142943)	0.462553** (0.054654)	0.138569 (0.203082)	0.114789 (0.179157)	0.893627	0.828108

** Significant at 1% probability level

*Significant at 5% probability level

X₁, X₂, X₃ and X₄ stands for seed, machinery charge, manure and fertilizers and human labour respectively.

Investment of farm Assets

Investment on farm assets such as farm building, implement and machinery and livestock on marginal, small and medium farms and overall farm are displayed in table 3 on average investment on overall for farm building, implements and machinery and livestock, accountant for 61.17, 26.40 and 12.44 percent respectively for the total farm assets. Which occurred Rs. 279116.00 (61.17), Rs. 120459.20 (26.40) and Rs. 56752.75 (12.44) respectively. Similarly per farm investment on implements and machinery also at the position trend with farm size as it increase with increasing the farm size. It was recorded Rs. 23955.79 (10.06), Rs. 59051.56 (14.42) and Rs. 246510.70 (37.40) against marginal, small and medium farm respectively. It is concluded from the table that per farm investment on building and farm machinery had direct relationship with farm size but in case of livestock the investment was hire on marginal farms followed by small and medium size of farm are respectively.

Structure of cost and Returns

Cost

Per hectare cost return from the cultivation of

chickpea crop on different categories of farms have been presented in table No. 4. It is obvious from the table that, on overall average per hectare cost of chickpea comes out to be Rs. 34353.35 per hectare which was maximum, Rs. 31619.09 on marginal farms followed by small and medium farms corresponding to Rs. 34924.74 and Rs. 35856.84 respectively. The cost of expenditure incurred on marginal sample due to more expenditure occurred on human labour and machinery charges as compared to other categories of farms. It was also observed from the table that cost of cultivation showed positive relationship with the size of group farms.

Return

It is observed from the table 5 that per hectare gross income was maximum to be Rs. 55722.00 On marginal farms followed by small and medium farms corresponding to Rs. 57240.00 and Rs. 57780.00 respectively in respect of all farms. Average gross income come to Rs. 22666.81, farm business income Rs. 38929.94, family income Rs. 31298.36 and farm investment income Rs. 30298.39 were also assessed and trend was showing positive relationship in the contest of various measures of income with size of farms.

Cost of production per quintal of chickpea was computed to Rs. 2802.07 on overall farms, which varied Rs. 2889.35 Rs. 2839.41 and Rs. 2632.73 on medium, small and marginal size group of farms. Cost of production per quintal had the negative relation with size of farms. Output-input ratio on marginal, small and medium farm was 1:1.76, 1:1.64 and 1:1.61 on cost C_3 .

Resource use efficiency

The Cobb-Douglas production function was applied to find out the efficiency of various resource use in the production of chickpea. The value elasticity of production, standard error, coefficient of multiple determination and return to scale for chickpea production of different size of groups of farm are or R^2 of the fitted function indicated that sufficient and large proportion of the total variation in the dependent variable is explained by the input included in the function. The table 6 further indicated that four (4) variable size seed, machinery charge, manure and fertilizer and human labour jointly explained 85.5, 85.44 and 89.36 present variation accused independent variable on marginal, small and medium farms respectively.

Return to scale on marginal, small and medium were found 0.855054, 0.854462 and 0.893627 respectively which are less than unity. Therefore concluded that cultivation of chickpea crop is characterized by decreasing returns to scale on marginal, small and medium size group of farms. It is also revealed from the table 6 there was statistically significant at 1 percent and 5 percent level of probability in all size groups of farms.

In conclusion chickpea is one of the major pulse crops grown in India (Bharat). The study based on randomly selected respondents of marginal, small and medium categories with average size of land holding as 0.1, 1.64

and 3.07 hectare respectively and overall average size of land holding 1.95 hectare.

According to the study conducted in the Banda district in case of chickpea, highest cost of cultivation was observed under medium size of sample farm mainly due to higher human labour, overall average cost of cultivation was observed to Rs. 2889.25, medium cost incurred in the chickpea crop was human labour having per share of 25.30 percent.

Per hectare gross income was observed maximum under medium farms (Rs. 57780.00) followed by small farms (Rs. 57240.00) and marginal farms (Rs. 55722.00), respectively. The gross income per hectare was highest on medium farms due to intensive cultivation & more use of human labour and seed on these farms for high productivity. Productivity on these farms was associated with better and timely management by farmers, which came to be Rs. 57020.16 where as net income was Rs. 22666.81 per hectare. On overall average, farm business income and family income were worked out Rs. 38929.94, Rs. 31298.36 per hectare, respectively. Cost of production per quintal of chickpea was estimated Rs. 2632.73, Rs. 2839.41, and Rs. 2889.35 on marginal, small, and medium farms, respectively. Input-output ratio related to cost C_3 was highest on marginal farms (1:1.76) followed by small farms (1:1.64) and medium farms (1:1.61).

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