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Cost and returns of maize cultivation in Surguja District of Chhattisgarh

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Abstract

The present study was conducted in Surguja district of Chhattisgarh, 150 farmers were selected purposely on the basis of the total number of farmers in the district with categories by different farm categories from the 12 villages. The main aim of the study was to find out the cost and return, marketing pattern, and constraints in the production and marketing of maize. The primary data was collected in the cropping year 2017–18 from sampled households through the personal interview method with the help of a well prepared schedule and questionnaire in which the cropping intensity was about (139.57%). An average cost of cultivation ha⁻¹ of maize was calculated at ₹28838.75. An average yield of 53.55 Q. ha⁻¹. On an average, the input output ratio in maize was 1:1.57 on the sample farms. The average cost of production per quintal of maize, was worked out to be, ₹538.54. The net income was calculated at ₹45220.04 ha⁻¹. There are 3 marketing channels for maize crop marketing preferred by sample households as given below: Producer–Consumers, Producer–Village Traders–Wholesaler–Processor–Retailer–Consumers, Producer–Wholesaler–Processor–Retailer–Consumers, Producer–Wholesaler–Processor–Retailer–Consumers, Producer–Wholesaler–Processor–Retailer–Consumers, Only 3 channels were preferred by sample households for the selling of maize. Most of the marginal farmers were sold through the village traders at about 46.15% because of the small quantity of products. It was clear most of the produce was sold through the agent, where 19.23%, 63.79%, and 61.11% were produced by small, medium, and large farmers. The maximum farm product sold through agents to consumers is 52.67%.

Keywords: Maize, cost and returns, income, farm size, tabular analysis, marketing, and major constraints

1. Introduction

Agriculture play a vital role in India's economy. 54.6% of the population is engaged in agriculture and allied activities (census 2011) and it contributes 17.4% to the country's Gross Value Added (current price 2014-15, 2011-12 series) (Department of Agriculture, Cooperation & Farmers' Welfare 2017). Maize (*Zea mize*) is also widely cultivated throughout the world, and a greater weight of maize is produced each year than any other grain. Worldwide production was 960 mt (2014–15). In India, maize is grown in an area of 8.85 mha with a production of around 21.81 mt and a productivity of 2581 kg ha⁻¹. It ranks next to rice, wheat, sorghum, and pearl millet. Chhattisgarh is one of the major cereal crops as it contributes (126.356 area in tha which has production of 177.82 mt and productivity of 1655 kg ha⁻¹ in *kharif* and 30.88 area in the which has production of 50.18 Mt and productivity of 162.49 kg ha⁻¹ in *Rabi*) in the year 2012–2013 (Directorate of Economics & Statistics Government of Chhattisgarh 2017-18). In the case of Surguja District, maize is the most preferred crop by the farmers after rice. The area of maize is 9470 ha and productivity is nearly 1093 kg ha⁻¹. The production of maize was 10.356 during 2016–17. Although the area of maize and its production has continuously increased in the past of the Surguja district with the following specific objectives:

- Calculate the cost and return on the maize crop in the study area.
- To examine the marketing pattern of Maize crop in the study area.
- To identify the constraints in production and marketing of Maize crop and to suggest remedial measures to overcome them.

2. Materials and Methods

2.1 Cultivation costs

The cost concept approach to farm costing is widely used in India. To work out the cost of cultivation, the standard method of cost of cultivation employed by the Commission on

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Agricultural Costs and Prices (CACP), Directorate of Economics and Statistics, Government of India was adopted, which includes Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, Cost C2 and Cost C3.

2.2 Disposable pattern

A simple analysis was done to examine the marketing pattern of maize at different categories of farms. To estimate the marketable surplus of produce, the total quantity used for different purposes was estimated as under:

MS=Total quantity produced minus the quantity used at home for various purposes.

3. Results and Discussion

3.1 The cost of cultivation of maize crops

The cost of cultivation of maize is shown in table 1 and figure 1. It can be seen that on an average, the cost of cultivation of

maize was estimated at ₹28838.75 ha⁻¹, which varied from ₹27242.92 ha⁻¹ at marginal farms to ₹29601.81 ha⁻¹ at large farms. Human labour cost (both family and hired labor) was found to be a major cost in maize cultivation. The average ha⁻¹ human labour cost was estimated at ₹4561.46, which varied from ₹3850.00 ha⁻¹ at marginal farms to ₹4900.00 ha⁻¹ at large farms. The next major cost was observed as seed, which was estimated at about ₹5250.00 ha⁻¹ of the total cost of cultivation, which varied from ₹5250.00 ha⁻¹ at marginal farms to ₹5250.00 ha⁻¹ at large farms. The average cost of bullock and machinery was estimated at ₹2574.26 ha⁻¹, which varied from ₹2549.17 ha⁻¹ at marginal farms to ₹2728.72 ha⁻¹ at large farms, and the average cost of manure and fertilizer was estimated at ₹6767.86 ha⁻¹, which varied from ₹6612.29 ha⁻¹ at marginal farms to ₹6805.17 ha⁻¹ at large farms respectively.

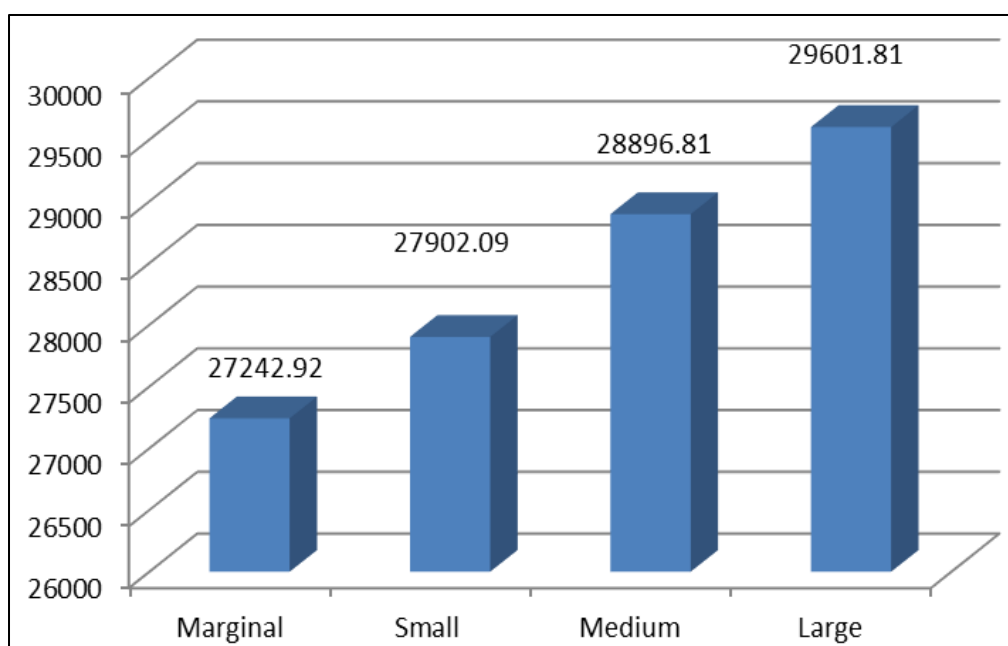


Fig 1: Cost of cultivation of maize at sampled households (₹ ha⁻¹)

Table 1: Cost of cultivation of maize at different size groups of farms (₹ ha⁻¹)

S.No.	Particular	Marginal	Small	Medium	Large	Overall
A	Variable cost					
1	Human labour					
	a) Family labour	2078.73 (7.63)	1872.12 (6.71)	1490.49 (5.16)	1285.11 (4.34)	1534.64 (5.32)
	b) Hired labour	1771.27 (6.50)	2327.88 (8.34)	3059.51 (10.59)	3614.89 (12.21)	3026.82 (10.50)
	Total human labour	3850.00 (14.13)	4200.00 (15.05)	4550.00 (15.75)	4900.00 (16.55)	4561.46 (15.82)
2	Bullock and machinery power					
	a) Bullock	649.17 (2.38)	330.30 (1.18)	228.33 (0.79)	124.88 (0.42)	235.69 (0.82)
	b) Machinery	1900.00 (6.97)	2000.00 (7.17)	2350.00 (8.13)	2603.84 (8.80)	2338.57 (8.11)
	Total bullock and machinery	2549.17 (9.36)	2330.30 (8.35)	2578.33 (8.92)	2728.72 (9.22)	2574.26 (8.93)
3	Seed	5250.00 (19.27)	5250.00 (18.82)	5250.00 (18.17)	5250.00 (17.74)	5250.00 (18.20)
4	Manure & fertilizers	6612.29 (24.27)	6730.00 (24.12)	6777.00 (23.45)	6805.17 (22.99)	6767.86 (23.47)
5	Plant protection	256.91 (0.94)	461.82 (1.66)	610.99 (2.11)	660.52 (2.23)	575.83 (2.00)

6	Irrigation charge	428.17	545.45	625.79	655.33	607.57
		(1.57)	(1.95)	(2.17)	(2.21)	(2.11)
7	Miscellaneous cost	150.00	200.00	250.00	300.00	251.64
		(0.55)	(0.72)	(0.87)	(1.01)	(0.87)
8	Interest on working capital	680.71	713.82	766.07	800.59	762.16
		(2.50)	(2.56)	(2.65)	(2.70)	(2.64)
	Total variable cost	19777.25	20431.39	21408.18	22100.33	21350.78
		(72.60)	(73.23)	(74.08)	(74.66)	(74.04)
B	Fixed cost					
9	Land revenue	12.00	12.00	12.00	12.00	12.00
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
10	Depreciation	95.00	100.00	117.50	130.19	116.93
		(0.35)	(0.36)	(0.41)	(0.44)	(0.41)
11	Interest on fixed capital	170.66	170.69	171.11	171.29	171.05
		(0.63)	(0.61)	(0.59)	(0.58)	(0.59)
12	Rental value of owned land	7200.00	7200.00	7200.00	7200.00	7200.00
		(26.43)	(25.80)	(24.92)	(24.32)	(24.97)
	Total fixed cost	7477.66	7482.69	7500.61	7513.48	7499.98
		(27.45)	(26.82)	(25.96)	(25.38)	(26.01)
C	Total cost (A+B)	27242.92	27902.09	28896.81	29601.81	28838.75
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in the parentheses are % to total cost of cultivation of maize

3.2 Cost and returns of the maize crop on the basis of a cost concept

Costs and returns based on the cost concept in maize production were provided in table 2. Overall, on an average, Cost-A1, Cost-A2, Cost-B1, Cost-B2, Cost-C1, Cost-C2 and Cost-C3 were worked out to ₹19933.07, ₹19933.07,

₹20104.12, ₹27304.12, ₹21638.76, ₹28838.76 and ₹31722.64 ha⁻¹, respectively, on the sampled farms. The average net income over Cost-A1, Cost-A2, Cost-B1, Cost-B2, Cost-C1, Cost-2, and Cost-C3 was ₹54164.93, ₹53993.88, ₹32169.18, ₹52459.24, ₹45259.24, and ₹42375.36, respectively.

Table 2: Break-up of total cost, cost concept wise income over different cost of maize (₹ ha⁻¹)

S. No.	Particular	Marginal	Small	Medium	Large	Overall
A	Break-up of cost					
1	Cost A1	17793.52	18659.27	20035.19	20945.41	19933.07
2	Cost A2	17793.52	18659.27	20035.19	20945.41	19933.07
3	Cost B1	17964.18	18829.96	20206.30	21116.70	20104.12
4	Cost B2	25164.18	26029.96	27406.30	28316.70	27304.12
	A2+FL	19872.25	20531.39	21525.68	22230.52	21467.71
5	Cost C1	20042.91	20702.08	21696.79	22401.81	21638.76
6	Cost C2	27242.91	27902.08	28896.79	29601.81	28838.76
7	Cost C3	29967.20	30692.29	31786.47	32561.99	31722.64
B	Gross income over different cost					
1	Income over cost A1	49211.48	52433.23	54156.31	55854.59	54164.93
2	Income over cost A2	49211.48	52433.23	54156.31	55854.59	54164.93
3	Income over cost B1	49040.82	52262.54	53985.20	55683.30	53993.88
4	Income over cost B2	41840.82	34099.65	31379.92	30830.7	32169.18
5	Income over cost C1	46962.09	50390.42	52494.71	54398.19	52459.24
6	Income over cost C2	39762.09	43190.42	45294.71	47198.19	45259.24
7	Income over cost C3	37037.80	40400.21	42405.03	44238.01	42375.36

3.3 The yield value of output and the cost of production of maize

Table 3 shows the yield value of output ha⁻¹ and the production price per Q. of maize. The average cost was to be estimated as ₹28838.75 ha⁻¹ which varied from ₹27242.92 ha⁻¹ at marginal farms to ₹29601.81 ha⁻¹ at large farms. Overall, 82.94 Q. ha⁻¹ were recorded on an average yield (main and

by-product yield). The average gross return varied from ₹74058.79. The gross return varied from ₹67005.00 ha⁻¹ at marginal farms to ₹76800.00 ha⁻¹ at large farms. On an average, the net income was ₹45220.04 ha⁻¹. The average production cost per Q. was estimated at ₹538.54. On an average, the input output ratio was 1:1.57, which varies from 1:1.46 at marginal farms to 1:1.59 at large farms.

Table 3: Economic value of maize at sample farms (₹ ha⁻¹)

S. No.	Particulars	Marginal	Small	Medium	Large	Overall
1	Main yield (qt ha ⁻¹)	48.50	51.45	53.65	55.50	53.55
	Price qt ⁻¹	1350.00	1350.00	1350.00	1350.00	1350.00
	Return (₹ ha ⁻¹)	65475.00	69457.50	72427.00	74925.00	72296.00
2	By product yield (qt ha ⁻¹)	25.50	27.25	29.40	31.25	29.39
	Price qt ⁻¹	60.00	60.00	60.00	60.00	60.00
	Return (₹ ha ⁻¹)	1530.00	1635.00	1764.00	1875.00	1762.76
3	Gross Return (₹ ha ⁻¹)	67005.00	71092.50	74191.50	76800.00	74058.79
4	Cost of cultivation (₹ ha ⁻¹)	27242.92	27902.09	28896.81	29601.81	28838.75
5	Net Return (₹ ha ⁻¹)	39762.08	43190.41	45294.69	47198.19	45220.04
6	Cost of production (₹ qt ⁻¹)	561.71	542.31	538.62	533.37	538.54
7	Input-output ratio	1:1.46	1:1.55	1:1.57	1:1.59	1:1.57

3.4 Maize quantity sold

The three types of marketing channels identified in the study area were as follows: Channel-I: Producer–Village trader, Channel-II: Producer–Retailer–Wholesaler; and Channel-III: Producer–Wholesaler at the producer level. The quantity sold by the producers is given in table 5. It is clear that three types of market intermediaries are prevalent in the study area. Most

of the growers overall sold about (52.67) %, (22.67)%, (15.33)%, and (9.33)% sold through agents, village traders, wholesalers, and consumers at marginal, small, medium, large, and average farms, respectively. During the course of study, it was learned from the growers that due to a lack of demand from the consumers directly, most of the quantity is disposed-off by them through agents and village traders.

Table 4: Q: quantity of maize seeds sold by producer to different functionaries of sample household (Qfarm⁻¹)

S. No.	Particulars	Marginal	Small	Medium	Large	Overall					
B.	Maize	Number	Quantity	Number	Quantity	Number	Quantity				
1	Consumer	3.00	1.38	5.00	1.65	4.00	1.80	2.00	2.50	14.00	1.83
		(11.54)	(2.92)	(8.62)	(3.30)	(8.33)	(3.46)	(11.11)	(4.65)	(9.33)	(3.61)
2	Agent	5.00	42.20	37.00	38.56	26.00	38.05	11.00	40.30	79.00	39.78
		(19.23)	(89.35)	(63.79)	(77.03)	(54.17)	(73.10)	(61.11)	(75.03)	(52.67)	(78.36)
3	Village Traders	12.00	1.80	8.00	6.00	11.00	8.50	3.00	7.51	34.00	5.95
		(46.15)	(3.81)	(13.79)	(11.99)	(22.92)	(16.33)	(16.67)	(13.98)	(22.67)	(11.73)
4	Wholesaler	6.00	1.85	8.00	3.85	7.00	3.70	2.00	3.40	23.00	3.20
		(23.08)	(3.92)	(13.79)	(7.69)	(14.58)	(7.11)	(11.11)	(6.33)	(15.33)	(6.30)
	Total	26.00	47.23	58.00	50.06	48.00	52.05	18.00	53.71	150.00	50.76
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figure in the parenthesis are quantity of maize seeds sold by producer to different functionaries of sample household

Table 5: Marketable surplus of maize of sample farms (Qtl.lfarm⁻¹)

S. No.	Particulars	Marginal	Small	Medium	Large	Overall
B	Maize					
1	Total quantity	48.50	51.45	53.65	55.50	53.55
	Produced	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
2	Quantity	0.14	0.11	0.09	0.10	0.11
	For seed	(0.29)	(0.22)	(0.16)	(0.18)	(0.21)
3	Consumption	1.13	1.28	1.51	1.69	1.40
		(2.33)	(2.48)	(2.82)	(3.04)	(2.62)
4	Total quantity	1.27	1.39	1.60	1.79	1.51
	Utilized	(2.62)	(2.70)	(2.98)	(3.22)	(2.82)
5	Marketable	47.23	50.06	52.05	53.71	52.04
	Surplus	(97.38)	(97.30)	(97.02)	(96.78)	(97.18)

Note: Figure in the parenthesis are quantity of maize seeds sold by producer to different functionaries of sample household

3.5 Constraints in the marketing of maize crops

Marketing constraints are presented in table 5. The lack of implementation of support prices in the villages is the major problem faced by maize producers. Almost all farmers confirmed that no intermediary was prepared to give the support price if produce was sold by farmers in the villages. If they sold their small produce in the market, more than 98.00% of maize producers believed that transportation of small quantities of produce was not an economical option. About

97.33% of farmers felt that lack of a sufficient number of processing units was also a problem. It may be suggested that the establishment of processing units in the maize producing area and the third one is the most constrained in exploitation by the middleman, so it is skipped for marketing so the use of direct selling to wholesalers and through retailers. Most of the maize growers were of the opinion that the maize crop is less profitable due to these marketing problems as compared to paddy production.

Table 6: Constraints in marketing of maize crops

S. No.	Particular	Maize	
		Number	Rank
1	Lack of implementation of MSP	150.00	I
		(100.00)	
2	Low price of product	113.00	IV
		(75.33)	
3	Lack of sufficient- Number of processing unit	146.00	II
		(97.33)	
4	Exploitation by middle man	128.00	III
		(85.33)	
5	Whether you like to store your produce in storage to get high prices	45.00	X
		(30.00)	
6	Lack of marketing in formation	87.00	VII
		(58.00)	
7	Whether you face problem because the quantity is small	68.00	VIII
		(45.33)	
8	Lack of storage facilities In growing area	113.00	V
		(75.33)	
9	Lack of awareness about Market news and intelligence	104.00	Vi
		(69.33)	
10	Lack of small Marketable Surplus	46.00	IX
		(30.67)	

Note: Figure in the parenthesis is constraints in marketing of maize crops.

4. Conclusion

The quantity of maize sold per farm was very low, which was mainly due to low productivity, failure to provide the MSP policy and an insufficient number of processing units. Policymakers can utilize these results for policy implication to fix MSP policy in maize through improved and high yielding varieties, technology, irrigation, marketing, policy and price support, and effective extension. A farmer should make local arrangements for storage facilities at his house and demand a processing unit from the government. Analyses the technology used by farmers for cultivation, marketing, and assessment of demand for farm produce. Scope for research work.

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