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To analyze costs and return from maize for different farm size categories in the northern hills of Chhattisgarh

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Abstract

Scientific study of any problem requires a systematic investigation using appropriate method and procedures in order to arrive at reliable, unbiased and practical conclusion Chhattisgarh state consisted of three agro climatic sub-zones *i.e.* Chhattisgarh plains, Northern hills and Bastar plateau. From these sub-zones Northern hills was selected purposively because of larger cultivated area under maize in zone. Therefore Northern hills will be selected for the study. Northern hills consist 5 districts. Two district from Northern hills *i.e.* Surajpur district and another one Balrampur district were selected purposively for the study. The primary data were collected by the survey of sampled collectors through personal interview method with the help of well pretested and structured schedules for the year 2019-20. The cost of cultivation of maize is essential to understand that how much cost incurred for different inputs and whether farmers are receiving the enough profit or not. It is therefore, It reveals that is costs and return of maize cultivation was estimated in ₹/ha, which is given in the Total cost of cultivation of maize of sampled farms was ₹ 32563.10 per hectare in which the share of total variable cost was 65.17 per cent followed by fixed cost 34.63 per cent. The total cost of cultivation of sugarcane was increasing with respect to farm size and was found maximum under large farms being ₹ 41797.10 per hectare and minimum in marginal farms being ₹ 27775.30 per hectare. It is important to note that total variable cost was increasing with respect to the farm size. Thus, it could be concluded that total cost of cultivation of maize in study area was increasing with respect to farm size holding because large farmers could incurred more expenditure on the material inputs.

Keywords: cultivation, farm, input, variable cost & fixed cost

1. Introduction

Maize is one of the most important cereal crops after rice. Maize has many assets for its wide distribution, its husk give protection from birds and rain can be harvested over a long period since it can be left dried in the field until harvesting is convenient, can be stored long, provide numerous useful food products and frequently preferred to sorghum and other millets. In fact it is a major source of starch. Corn starch (maize flour) is a major ingredient in home cooking and in many industrialized food products. Maize is also a major source of cooking oil (corn oil) and of maize gluten. Maize starch can be hydrolyzed and enzymatically treated to produce syrups, particularly high fructose corn syrup, a sweetener; and also fermented and distilled to produce grain alcohol. Among maize growing countries India ranks 4th in area and 7th in production, during 2018-19 in India the maize area has reached to 9.2 million ha (DACNET, 2020).

During 1950-51 India used to produce 1.73 million MT maize, which has increased to 28.98 million MT by 2019-20, recording more than 16 times increase in production. The average productivity during the period has increased by 5.42 times from 547 kg/ha to 2965 kg/ha, while area increased nearly by three times. In Chhattisgarh maize occupies 118047 hectare land with the productivity of 2568 Kg/ha in 2018-19. It is a kharif season crop in Chhattisgarh and second most important crop next to paddy in terms of both area and production. The maize area of the State has increased from 93.4 thousand ha in 2000-01 to 118.04 thousand ha in 2018-19, while the production has gone up from 125.7 thousand tons to 303.14 thousand tons. There is 2.03 times increase in productivity in the state. The yearly growth rate of maize area, production and productivity of the State since 2000-01 indicated that there is a steady increase over the years.

2. Method of enquiry and data collection

The primary data were collected by the survey of sampled collectors through personal interview method with the help of well pretested and structured schedules for the year 2019-20.

3. Cost Concepts

To work out the cost of cultivation standard method was adopted which includes cost A cost B and cost C.

Cost A₁: Consist of following 16 items of costs:-

1. Value of hired human labour (permanent & casual)
2. Value of owned bullock labour
3. Value of hired bullock labour
4. Value of owned machinery
5. Hired machinery charged
6. Value of fertilizers
7. Value of manure (produced on farm and purchased)
8. Value of seed (both farm-produced and purchased)
9. Value of insecticides and fungicides.
10. Irrigation charges (both of the owned & owned and hired tube wells, pumping sets etc).
11. canal-water charges
12. Land revenue, cesses and other taxes
13. Depreciation on farm implements (both bullock drawn & worked with human labour)
14. Depreciation on farm building, farm machinery.
15. Interest on the working capital.
16. Miscellaneous expenses (wages of artisans, and repairs to small farm implements)

Cost A₂ = Cost A₁ + Rent paid for Leased in Land.

Cost B₁ = Cost A₁ + Interest on value of Owned Capital assets (excluding land)

Cost B₂ = Cost B₁ + rental value of owned land (Net of land revenue) and rent paid for leased-in land.

Cost C₁ = Cost B₁ + Imputed value of Family Labour.

Cost C₂ = Cost B₂ + Imputed value of Family labour.

Cost C₃ = Cost C₂ + value of management input at 10% of

cost C₂.

Cost of production

Cost of production = Cost of cultivation / Quantity of Product

4. Result and Discussion

The cost of cultivation of maize is essential to understand that how much cost incurred for different inputs and whether farmers are receiving the enough profit or not. It is therefore, It reveals that is costs and return of maize cultivation was estimated in ₹/ha, which is given in the Total cost of cultivation of maize of sampled farms was ₹ 32563.10 per hectare in which the share of total variable cost was 65.17 per cent followed by fixed cost 34.63 per cent. The shares of total human labour cost was maximum (31.88%) followed by total material cost (20.57%), total power cost (10.65) and interest on working capital was (2.07%) respectively. In materials cost seed was (10.58 %) and fertilizer & manure (7.87). The share of hired labour cost was comparatively more than that of family labour cost which is found to be 19.16 and 12.72 per cent of hired and family human labour cost. The machine power was found to be 9.45 per cent while use of bullock power was only 1.20 per cent to the total variable cost. The total fixed cost was accounted 34.83 per cent to total cost of cultivation irrespective to the farm size of holdings. The total fix cost with respect to the farm size of holding was gradually decreasing which reflects the scale to economy is worked. The evidences indicates that rental value of land was the major fixed cost and showed (31.34 %) followed by interest of fixed capital (1.97), depreciation (1.48) and land revenue (0.04%) respectively. The total cost of cultivation of sugarcane was increasing with respect to farm size and was found maximum under large farms being ₹ 41797.10 per hectare and minimum in marginal farms being ₹ 27775.30 per hectare. It is important to note that total variable cost was increasing with respect to the farm size.

Table 1: Analysis of cost of cultivation of maize per hectare on the basis of cost concept

S. No.	Particulars	Marginal	Small	Medium	Large	Overall
1	Seed cost	2950 (10.62)	3326 (10.40)	3884 (10.54)	4568 (10.93)	3447.11 (10.58)
2	Plant protection	504 (1.81)	696 (2.18)	848 (2.30)	1096 (2.62)	703.36 (2.12)
3	Manure and fertilizers	1588.5 (5.72)	2512.32 (7.86)	3497.94 (9.49)	4980 (11.91)	2663.98 (7.87)
A	Total material cost	5042.5 (18.15)	6534.32 (20.44)	8229.94 (22.33)	10644 (25.47)	6814.45 (20.57)
4	Family human labour	5110 (18.40)	3744 (11.71)	2934 (7.96)	2282 (5.46)	3917.59 (12.72)
5	Hired human labour	3306 (11.90)	6468 (20.23)	9552 (25.91)	11698 (27.99)	6525.67 (19.16)
B	Total human labour	8416 (30.30)	10212 (31.94)	12486 (33.87)	13980 (33.45)	10443.25 (31.88)
6	Bullock labour	600 (2.16)	400 (1.25)	0 (0.00)	0 (0.00)	349.33 (1.20)
7	Machine power	2205 (7.94)	3031 (9.48)	4116 (11.17)	4725 (11.30)	3139.73 (9.45)
C	Total power cost	2805 (10.10)	3431 (10.73)	4116 (11.17)	4725 (11.30)	3489.07 (10.65)
8	Interest on working Capital	462.14 (1.66)	681.33 (2.13)	875.91 (2.38)	1106.68 (2.65)	689.70 (2.07)
A	Total variable cost	16725.64 (60.22)	20858.7 (65.24)	25707.85 (69.74)	30455.68 (72.87)	21436.48 (65.17)
10	Land revenue	12	12	12	12	12.00

		(0.04)	(0.04)	(0.03)	(0.03)	(0.04)
11	Depreciation	412.21	474.36	510.14	687.45	484.83
		(1.48)	(1.48)	(1.38)	(1.64)	(1.48)
12	Rental value of land	10000	10000	10000	10000	10000
		(36.00)	(31.28)	(27.13)	(23.93)	(31.34)
13	Interest on fixed Capital	625.45	629.18	631.33	641.97	629.81
		(2.25)	(1.97)	(1.71)	(1.54)	(1.97)
B	Total fixed cost	11049.66	11115.54	11153.47	11341.42	11126.64
		(39.78)	(34.76)	(30.26)	(27.13)	(34.83)
C	A+B	27775.30	31974.19	36861.32	41797.10	32563.10

Note: Figures in parentheses indicates percentages

5. Economics of maize

The economics of maize cultivation has been understood by considering the economic parameters *viz*; yield of maize, cost of cultivation, gross return, net return, cost of production, input-output ratio, which is presented in Table 2. It has been observed from empirical findings that net return over total cost of cultivation of maize was ₹. 32563.10 per hectare, irrespective to the farm size holding and it was vary from

₹.27775.80 to ₹.41797.10 per hectare for marginal to large farms size. It is being observed that returns to scale was operating in maize cultivation. The per quintal cost of production was found to be 854.10, 817.13, 798.73 and 754.32 for marginal, small, medium, and large farms size, respectively. Overall, input-output ratio was found to be 1:1.59 respectively.

Table 2: Economics of maize cultivation under different farms size groups (₹/ha)

S. No.	Particulars	Farm Size				
		Marginal	Small	Medium	Large	Overall
1	Yield (q/ha)	32.52	39.13	46.15	55.41	40.03
2	Cost of cultivation (₹/ha)	27775.30	31974.19	36861.32	41797.10	32563.10
3	Gross return (₹/ha)	42276	50869	59995	72033	52045.24
4	Net return (₹/ha)	14500.70	18894.81	23133.68	30235.90	19482.14
5	Cost of production (₹/qt.)	854.10	817.13	798.73	754.32	819.54
6	Input -Output ratio	1:1.52	1:1.59	1:1.63	1:1.72	1:1.59

6. Cost and returns on the basis of different cost concept

6.1 Cost on the basis of different cost concept

Generally, 7 cost concepts used for estimation of costs and return by Commission for Agricultural Costs and prices, Government of India. Cost of cultivation of maize of sample farms in the study area has been worked out and presented in Table 3. It is evident from the Cost A₁ which is designated as the variable cost including land revenue and interest on working capital and excluding family labour was found to be ₹ 18015.71 per hectare on overall basis, which was added with rent paid for lease in land and dignified with Cost A₂ which was found to be ₹ 18015.71 per hectare which is same

as cost A₁ there was no any case for leased in and leased out of land during course of investigation. Cost B₁ is cost A₁ added with interest on value of owned capital assets (excluding land) which was found to be ₹ 18645.52 per hectare. Cost B₂ is cost B₁ added with rental value of owned land which was found to be ₹ 28645.52 per hectare. Cost C₁ is cost B₁ added with imputed value of family labour which was ₹ 22563.10 per hectare. Cost C₂ is cost B₂ added with imputed value of family labour which is ₹ 32563.10 per hectare. Cost C₃ is cost C₂ included with value of management input at 10 per cent of cost C₂ which is ₹ 35819.41 per hectare.

Table 3: Break-up of total cost according to cost concept

Farm size	Marginal	Small	Medium	Large	Overall
Cost A ₁	12039.85	17601.01	23295.99	28873.13	18015.71
Cost A ₂	12039.85	17601.01	23295.99	28873.13	18015.71
Cost B ₁	12665.30	18230.19	23927.32	29515.10	18645.52
Cost B ₂	22665.30	28230.19	33927.32	39515.10	28645.52
Cost C ₁	17775.30	21974.19	26861.32	31797.10	22563.10
Cost C ₂	27775.30	31974.19	36861.32	41797.10	32563.10
Cost C ₃	30552.83	35171.60	40547.45	45976.81	35819.41

6.2 Return obtained over different costs

Returns obtained over different costs of maize on sample farms in the study area has been worked out and presented in Table 4.8. The return over cost A₁, A₂, B₁, B₂, C₁, C₂ and C₃

is obtained by subtracting them from Gross return of sugarcane respectively. So, the return over cost A₁, A₂, B₁, B₂, C₁, C₂ and C₃ is ₹ 34029.53, 34029.53, 33399.72, 23399.72, 29482.14, 19482.14 and 16225.83 per hectare respectively.

Table 4: Return obtain over different costs

Farm size	Marginal	Small	Medium	Large	Overall
Return over Cost A ₁	30236.15	33267.99	36699.01	43159.87	34029.53
Return over Cost A ₂	30236.15	33267.99	36699.01	43159.87	34029.53
Return over Cost B ₁	29610.70	32638.81	36067.68	42517.90	33399.72
Return over Cost B ₂	19610.70	22638.81	26067.68	32517.90	23399.72

Return over Cost C ₁	24500.70	28894.81	33133.68	40235.90	29482.14
Return over Cost C ₂	14500.70	18894.81	23133.68	30235.90	19482.14
Return over Cost C ₃	11723.17	15697.391	19447.548	26056.19	16225.83

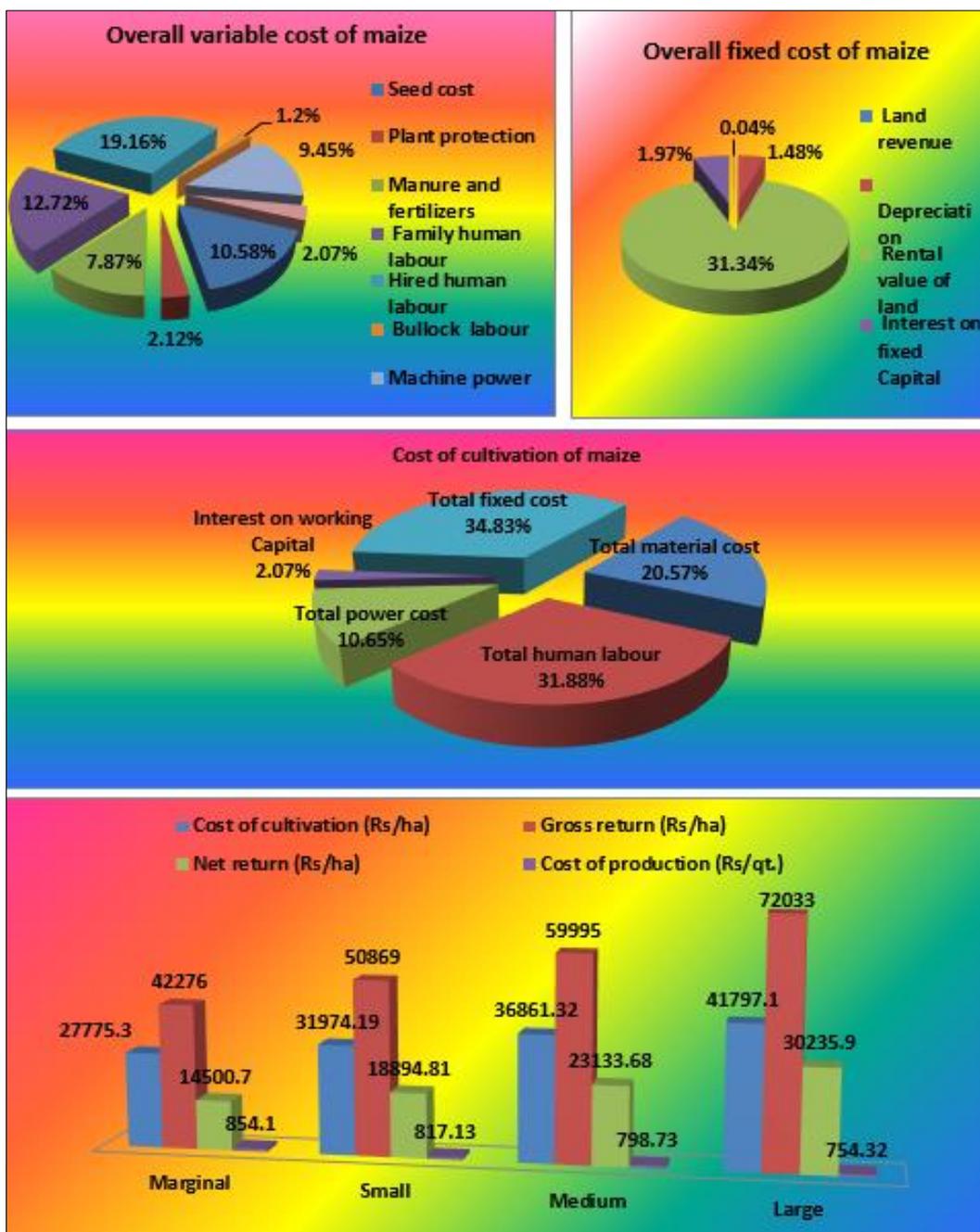


Fig 1: Cost of cultivation & economic of maize

7. Conclusion

The result show on an overall basis cost of cultivation per hectare of maize was ₹32563.10 per hectare. The cost of cultivation per hectare showed increasing trend with respect to the farm size of holdings. Overall, on an average the cost of cultivation per hectare of maize was found to be ₹ 32563.10 per hectare. The cost of cultivation in case of large farm was higher (₹41797.10/ha.) followed by small farms (₹31974.19/ha.), medium farms (₹36861.32/ha.) and large (₹ 41797.10 ha.). On an overall basis the family labour cost and hired labour cost for the production of maize per hectare was observed to be ₹3917.59 and ₹6525.67 is found that most of the work was performed by hired labour. On an overall basis net return in maize cultivation was ₹ 19482.14 per hectare.

The average yield of maize in the study area was 40.03 quintal per hectare which shows very satisfactory result in respect to average yield of Chhattisgarh i.e. about 34.31 quintal per hectare. The cost on the basis of cost concept in the production of maize on the sample farm of different size groups have been overall Cost A1, Cost A2, Cost B1, Cost B2, Cost C1 Cost C2, and Cost C3 were worked out to ₹18015.71, ₹18015.71, ₹18645.52, ₹28645.52, ₹32563.10and ₹35819.41hectare respectively on the sample farms. The income over different cost were also worked out. The average income over cost A1, Cost A2, cost B1, cost B2, Cost C1 Cost C2, and Cost C3 were calculated as ₹34029.53, ₹340 29.53, ₹33399.72, ₹23399.72, ₹29482.14, ₹19482.14, ₹16225.83 respectively. Thus, it could be concluded that total

cost of cultivation of maize in study area was increasing with respect to farm size holding because large farmers could incurred more expenditure on the material inputs. While input-output ratio showing increasing trend with respect to farm size. Overall, input-output ratio was found to be 1:1.59.

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