"Costs, Returns of Sorghum in Bhind District of Madhya Pradesh"

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Abstract: Sorghum (Sorghum Bicolor L. Moench) is one of the four major food grains of the world millions of people in Africa and Asia depend on sorghum as the staple food. Bhind district of Madhya Pradesh was selected purposively Mehgaon block was selected purposively to fulfil the objectives of the present study. 20 respondents were selected by simple random sampling method. Thus total 60 respondents were considered for detail investigation. Survey method was used for collection of the relevant data from selected respondents. Sorghum crop was higher production as compare to Pearl-millet crop. It can be concluded that Sorghum crop was higher profitable as compare to Pearl-millet crops. Farm business income and family labour income were higher in Sorghum followed by Pearl-millet crops. Cost of production per quintal was observed that higher in Sorghum followed by Pearl-millet crops respectively. Input output ratio was also found higher in case of Sorghum crop at cost C_3 level followed by Pearl-millet crops per hectare in the study area.

Keywords: Sorghum, Operational cost, Cost of production

Introduction

Sorghum (Sorghum Bicolor L. Moench) is one of the four major food grains of the world millions of people in Africa and Asia depend on sorghum as the staple food. It used as industrial raw material in various industries in USA and other developed countries and the Fodder and Stover is fed to millions animals providing milk and meat for man. In India market year 2019 sorghum area is 5.0 million hectare and production 4.5 million tonnes. Maharashtra is the largest producer of sorghum in India. The occupies almost 35% of the total cultivated area and 41.5% of the total production of sorghum in the country. Karnataka and Madhya Pradesh are 2nd and 3rd largest producers of sorghum in the country respectively. These three states together contribute around 62% in the total production. District wise highest production of Sorghum crop in Wadwani district of Madhya Pradesh.

Materials and Methods

Bhind district of Madhya Pradesh was selected purposively .The Mehgaon block was selected purposively to fulfil the objectives of the present study. 20 respondents were selected by simple random sampling method. Thus total 60 respondents were considered for detail investigation. Primary data certain to the Agril. Year 2019-20. The secondary data on area, production & productivity of pearl-millet crop for Bhind district of M.P. State were collected. The secondary data also collected relates to background of the study area from Agri. Statistics of Madhya Pradesh and, published by D.D.A. office of Bhind. For collection of data, personal interview using pre-tested interview schedule were used. The following cost concepts were used

Cost A1	= All actual express incurred by the producer in the Pearl-millet & sorghum production.
Cost A2	= CostA1 + rent paid for leased in land.
Cost B1	= CostA2 + interest on value of owned fixed capital excluding land.
Cost B2	= CostB1 + rental value of owned land.
Cost C1	= CostB1 + imputed value of family labour.
Cost C2	= CostB2 + imputed value of family labour.
Cost C3	= CostC2 + 10% of CostC2 as a managerial cost.

Profitability Concept

Total Production: Main product, Gross Income: Quantity of main product x price/unit of pearl-millet.Net Income: Gross income – total expenses of production. Farm business income = Gross income – CostA1. Family labour income = Gross income – CostB2. Net income = Gross income – CostC3.Benefit Cost Ratio: Benefit Cost Ratio = Gross income/Total cost. Cost of production: It is the ratio of total cost incurred on pearl-millet & sorghum production and physical output obtained on sample farms.

$$\text{Cost of production (Rs/qt.)} = \frac{Total\ cost}{Main\ product}$$

Resource use efficiency: Cobb-Douglas production functions were used for estimation of Resource use efficiency in cultivation of pearl-millet, it is widely used by various research workers for studying resource use efficiency and they obtain precise results.

$$Y = aX1\ b1.\ X2\ b2.\ X3\ b3\ ....Xk\ bk$$

$$\text{Log } Y = \log a + b1 \log X1 + b2 \log X2 ....+ bk \log Xk.$$

Where: Y = Dependent variable (gross income), a = Constant or intercept value, b1 to bk = are regression coefficients of X1 to Xk variables and X1 to Xk = variables used

Results

Cost of cultivation of Pearl-millet crop

The operational cost which explicit cost was computed from actual expenses incurred by farmers. The fixed cost which explicit cost derived by actual survey data of the farmer for all the categories small, medium and large size of the land holding. The details are presented in table 1.In sorghum crop the family human labour in small size was 14.84 percent followed by medium size of 11.08 percent and large size it was 6.77 percent of total cost. In overall family human labour was used in 10.60 percent of total overall family human labour. It revealed that as the size of holding increases the family human labour cost decreases to the total cost. In this crop the hired human labour used by the large size 15.24 percent followed by medium size 12.92 percent and small size 10.60 percent. Overall in Sorghum crop of the farmers 13.09 percent used hired human labour. Value of owned machine labour in Sorghum crop was higher used in medium size 11.81 percent followed by small size (12.72 percent) and large size 6.77 percent. Overall owned machine labour was used 10.23percent hectare. The material cost i.e. seed, fertilizer, plant protection measured used by large size 30.14 percent was higher followed by medium size 25.84 percent and small size 22.90 percent of the total cost. Overall material cost in Sorghum crop was 26.56 percent of the total overall cost. Irrigation charges was higher in large size i.e. 3.39 percent followed by medium size 2.95 percent and small size it was 2.99 percent of the total cost. An overall irrigation charge was 2.99 percent of the total overall cost. The operation cost Sorghum crop it was higher in medium size i.e. 64.61 percent followed by small and large size of the farmer i.e. 63.62 percent and 62.32 percent of the total cost respectively. Overall total operational cost in Sorghum crop was 63.47 percent of total cost. Fixed cost in small size 36.38 percent followed by medium size 35.39 percent and in large size it was 37.68 percent. Fixed cost has the negative relation with the size of holding. The total cost was high in large size Rs. 29526 per ha in medium size it was Rs. 27086 per ha and in small size was Rs. 23579 per ha. The total overall cost Rs. 26730 per ha the total cost have positive relationship with the size of holding.

Cost of cultivation of Sorghum crop according to cost concept

The cost of concept in the farm management studies were used to work out different cost of cultivation per hectare. In the present study seven different cost concepts were worked out in Sorghum crop of the farmers as given in the table 2.Cost A_1 included all the variable expenses including interest on working capital and depreciation, and rent on land etc. In work out the cost A_1 in small size were Rs. 23579, Rs. 27086 in medium and Rs. 29526 in large size of farmer. Overall cost A_1 was Rs. 26730, per ha in study area. Cost A_2 was calculated to be same as cost A_1 since all the land of respondent was owned, therefore, no rent paid for leased in land. Cost B_1 was workout to the cost A_1 + Interest on fixed capital, cost B_1 in small size was Rs. 25479 in medium size it was Rs. 29186 and in large size Rs.

Table 1: Break up of cost of cultivation of Sorghum crop

(Rs/ha)

S.N.	Cost item	Size Groups			Over all (60)
		Small Farmers (20)	Medium Farmers (20)	Large Farmers (20)	Overall Farmers (60)
I.	Operational Cost				
A	Labour Cost				
1	Value of family labour	3500(14.84)	3000(11.08)	2000(6.77)	2833(10.60)
2	Value of hired human labour	2500(10.60)	3500(12.92)	4500(15.24)	3500(13.09)
3	Value of machine labour	3000(12.72)	3200(11.81)	2000(06.77)	2733(10.23)
B	Material cost				
	Value of seed	1400(5.94)	1500(5.54)	1600(5.42)	1500(5.61)
	Value of fertilizers and manure	2000(8.48)	3000(11.08)	3800(12.87)	2933(10.97)
	Plants Protection	2000(8.48)	2500(9.23)	3500(11.85)	2667(9.98)
	Irrigation charges	600(2.54)	800(2.95)	1000(3.39)	800(2.99)
	Interest on working capital 5%	300(1.27)	582.97(2.15)	690(2.34)	524(1.96)
	Total operational cost	15000(63.62)	17500(64.70)	18400(62.32)	16967(63.47)
II.	Fixed cost				
1	Land revenue Taxes	2(0.01)	2.7(0.01)	2.8(0.01)	3(0.01)
2	Rental Value of land	5927(25.14)	6350(23.44)	6773.333(22.94)	6350(23.76)
3	Depreciation	300(1.27)	350(1.29)	360(1.22)	337(1.26)
4	**Interest on fixed capital**	1900(8.06)	2100(7.75)	2500(8.47)	2167(8.11)
	Total Fixed cost	8579(36.38)	9585.67(35.39)	11126.13(37.68)	9764(36.52)
	Miscellaneous	150(0.64)	200(0.74)	800(2.71)	383(1.43)
	Total OC+FC	23579 (100)	27085.67 (100)	29526.13 (100)	26730.19 (100)

Table 2: Cost of cultivation of Sorghum according to cost concept

Unit-Rs/ha

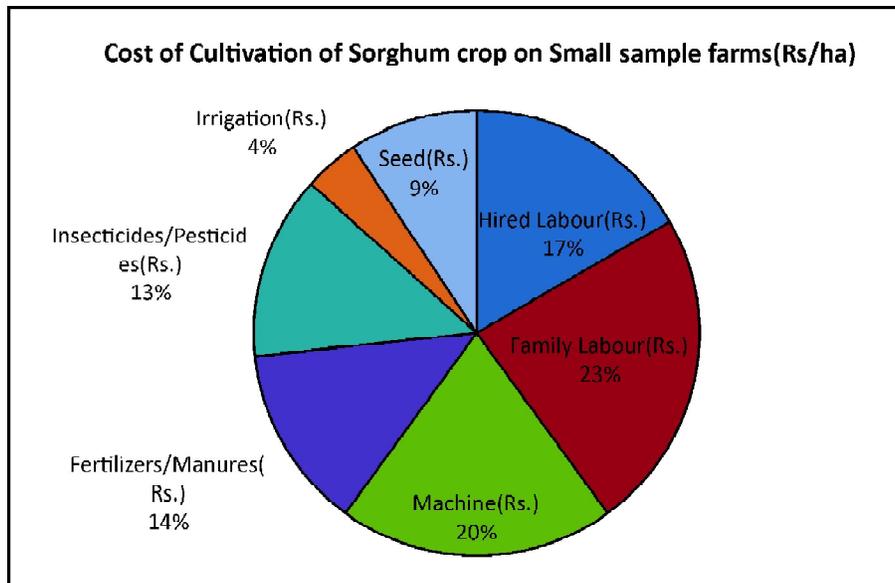| S.N.	Cost	Small farmers(20)	Medium Farmers(20)	Large Farmers(20)	Overall Farmers (60)
1	Cost A_1	**23579**	**27086**	**29526**	**26730**
2	COST A_2	**23579**	**27086**	**29526**	**26730**
3	COST B_1	25479	29186	32026	28897
4	Cost B_2	31405	35536	38799	35247
5	CostC_1	28979	32186	34026	31730
6	CostC_2	34905	38536	40799	38080
7	CostC_3	38396	42389	44879	41888

Figure 1: Cost of cultivation of Sorghum crop on small and medium sample farms (Rs/ha)
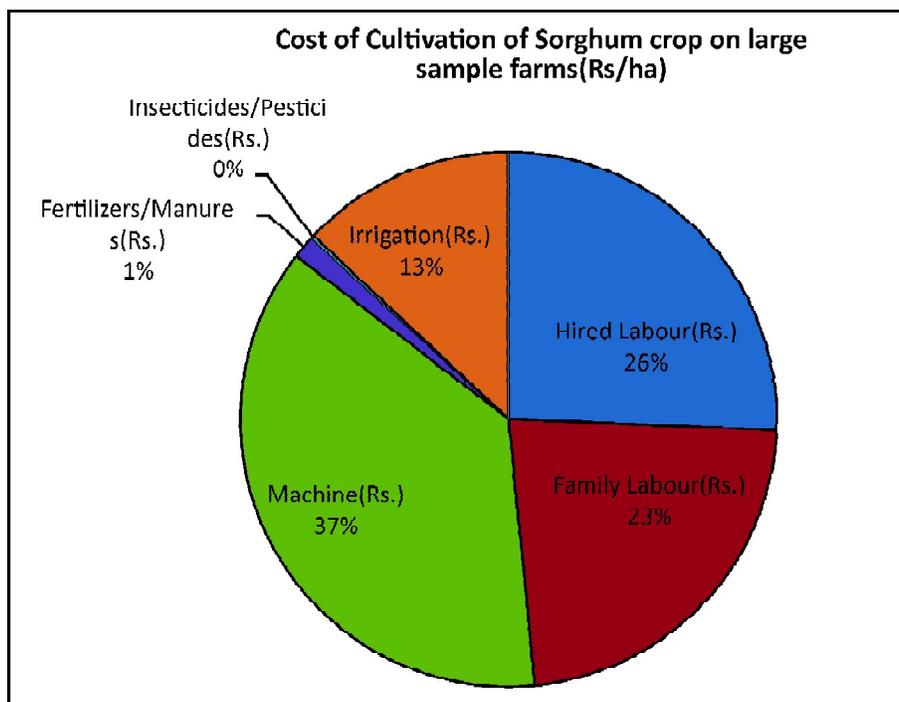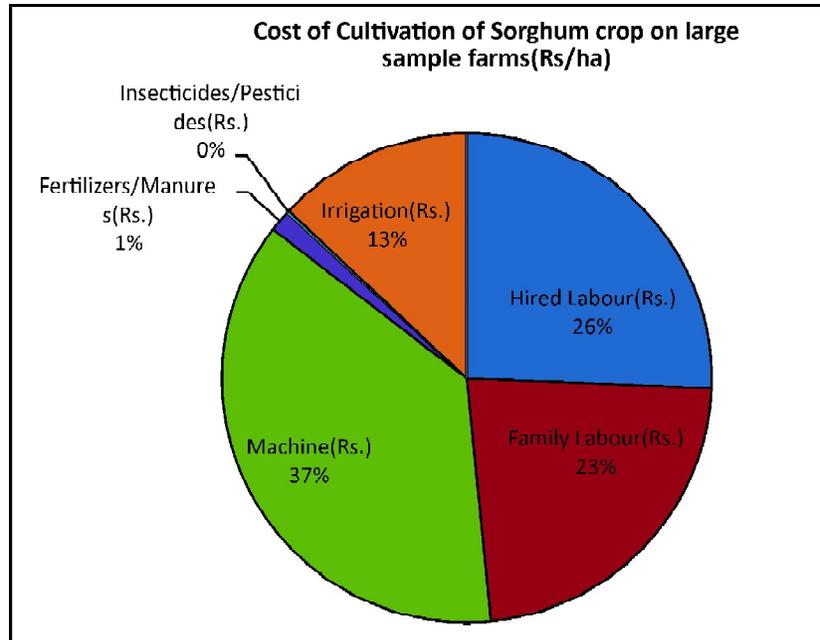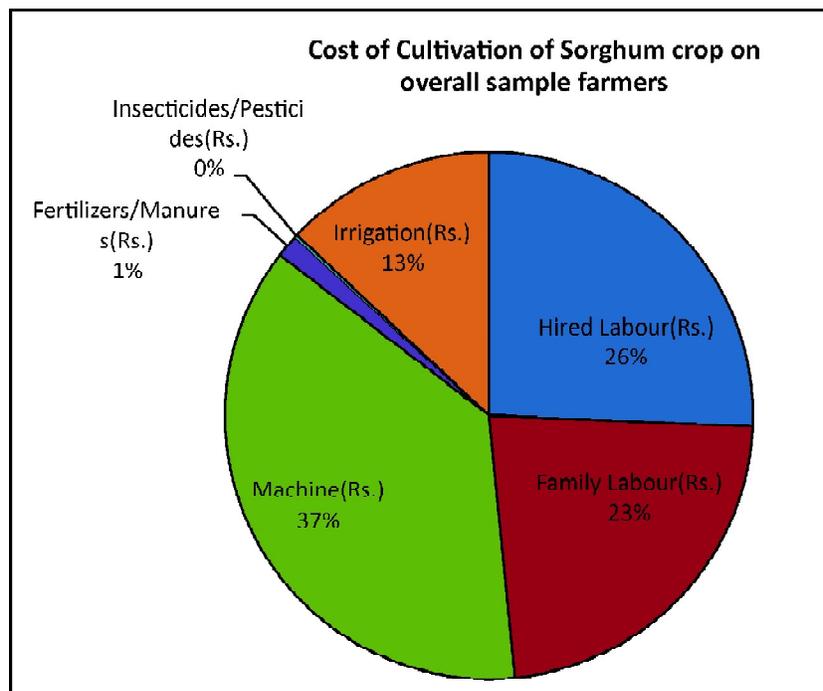
Figure 2: Cost of cultivation of Sorghum crop on large and overall sample farms (Rs/ha)
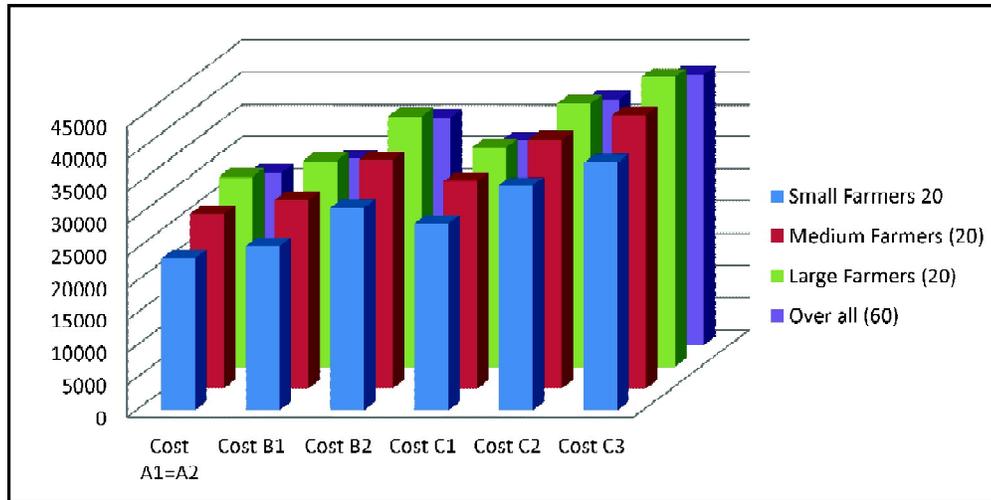
Figure 3: Cost of cultivation of Sorghum crop according to cost concept on sample farms (Rs/ha)

32026 Overall cost B_1 was Rs. 28897 per ha in the study area. Cost B_2 was worked by out cost B_1 + rental value of owned land. In the rental value of owned land was Rs. 5927, Rs. 6350,and Rs. 6773.33 per ha in small, medium and large size respectively. The cost B_2 was Rs. 31405 in small size, Rs. 35536 in medium size and Rs. 38799 in large size. Overall cost B_2 was Rs. 35247 per ha in the study area. Cost C_1 is cost B_1 + imputed value of family labour. It was found in small size was Rs. 28979 in medium size Rs. 32186 and in large size it was Rs. 34026 per ha in the study area. Overall cost C_1 was Rs. 31730 per ha. Cost C_2 is cost B_2 + imputed value of family labours. In Sorghum it was Rs.34905, Rs.38536 and Rs.40799 for small medium and large size respectively. Overall cost C_2 was found Rs.38080 per ha. In Cost C_3, Cost C_2 + 10 percent or managerial cost C_2. In case of small, medium and in large size Rs.38396, Rs.42389 and Rs.44879 per ha respectively. Overall cost C_3 was Rs. 41888 per hectare of the study area.

Conclusion

In sorghum crop overall family human labour was used in 10.60 percent of total overall family human labour. It revealed that as the size of holding increases the family human labour cost decreases to the total cost. Overall material cost in Sorghum crop was 26.56 percent of the total overall cost. Irrigation charges were higher in large size an overall irrigation charge was 2.99 percent of the total overall cost. Overall total operational cost in Sorghum crop was 63.47 percent of total cost. Fixed cost has the negative relation with the size of holding. The total overall cost Rs. 26730 per ha the total cost have positive relationship with the size of holding. Overall cost A_1 was Rs. 26730, per ha in study area. Overall cost B_1 was Rs. 28897 per ha in the study area. Overall cost B_2 was Rs. 35247 per ha in the study

area. Overall cost C_1 was Rs. 31730 per ha. Overall cost C_2 was found Rs. 38080 per ha. Overall cost C_3 was Rs. 41888 per hectare of the study area. Overall gross income of Sorghum crop was Rs. 100420 per ha in the selected farmers. Overall net income of Sorghum crop was Rs. 58532per ha. Overall farm business income of Sorghum crop was 71523per ha in the study area.Overall family labour income was Rs. 65173 per ha in the selected study area. Overall cost of production per quintal was Rs. 1269 in selected farmers. The input output ratio was high in small size followed by medium and large size i.e. 1: 2.60, 1: 2.1732 and 1: 2.30respectively. Overall input output ratio was 1: 2.40.it can be concluded that human labour and seed were significant and negative for small, medium, large and average size groups. Fertilizer and manure were significant for small, medium, large size and average size groups. Fertilizer, plant protection measure, and irrigation charges machine labour X_6 was significant for medium and large size. Cost of cultivation per hectare (Cost C_3) was higher in Sorghum followed by Pearl-millet crops. It was Rs. 41888, and 21336 for Sorghum, Pearl-millet crops respectively. Sorghum crop was higher production as compare to Pearl-millet crop. It can be concluded that Sorghum crop was higher profitable as compare to Pearl-millet crops. Farm business income and family labour income were higher in Sorghum followed by Pearl-millet crops. Cost of production per quintal was observed that higher in Sorghum followed by Pearl-millet crops respectively.Input output ratio was also found higher in case of Sorghum crop at cost C_3 level followed by Pearl-millet crops per hectare in the study area.

References

Panin, A. (2000). Economics of smallholder sorghum and maize production systems in Botswana: a comparative analysis. *Department of Agricultural Economics, Education & extension. 101 (2); 191-197.*

Vergara, O., H. Pritre and D. Parvi (2001). Economic evaluation of lepidopterist Pests in intercropped sorghum and maize in southern Honduras. *Tropical Agriculture. 78. (3): 190-199.*

Yapi, A.M., A.O. Kergna, S.K. Debrah and A. Sidibe (2000). Analysis of the Economic impact of sorghum and millet research in mali. *International Crops Research institute for the semi-arid Tropics (ICRISAT)-WASIP.53(17):124-129*

Zalkuwi, J., Singh, R., Bhattarai, M., Singh, O.P. and Dayakar B.N. (2014). Profitability analysis of sorghum production in India. *International Journal of Commerce, Business and Management. 3(5): 2319-2828.*

Nagaraj, N., Basavaraj, G., Rao, P.P., Cynthia Bantilan and Surjit Haldan (2013). Sorghum and Pearl-millet Economy of India. *Economic and Political Weekly. XLVIIINO: 52: 74-78.*

Chapke, R.R., Mondal, B and Mishra, J.S. (2011). Resource use efficiency of sorghum (Sorghum bicolor) production in rice (Oryza sativa) fallows in Andhra Pradesh, India. *Journal of Human Ecology. 34 (2): 87-90.*

Chauhan, S.S., J.M. Dighe and R.A. Sharma (2002). Economics of sorghum production under different levels of fertility in Malwa region. *Crop Research Hisar. 23(3): 428-430.*

Dave M. (2009). Enhancing sorghum Yield and profitability through Efficient Nitrogen Management. *KSU Summary Sheet of United Sorghum check off program's call for Research Proposals 8p.*

Narvariya R. Ashok C.S, Shahu., M., Raghuvanshi J.S. and Narvariya D. (2015). Resource use efficiency in wheat production in Narmadapuram division. *Eco. Env. & Cons.* 21 pp. (S149-S151)

Narvariya R.K., Narvariya D.and Raghuvanshi J.S. (2015). Profitability in Cultivation of Chick Pea Production in Central Narmada Valley of Madhya Pradesh. *Journal of Agroecology and Natural Resource Management,* Vol(2) pp. 283-285

Pagare, K.H., More, S.S., Shrey, R and Debnath, P. (2013). Resource productivity, resource use efficiency and return to scale in of small, medium and large rabi jowar growers in Marathwada region. *International Journal of commerce and Business Management.* 6(2): 206-210.

Pawar, B.R. and Pawar, D.B. (2006). Resource productivity, resource use efficiency and optimum resource use in rainfed pearl-millet production. *International Journal of Agricultural Sciences.* 2(1): 112-114.

Verma, P.K. and Banafar, K.N.S. (2013). Economic analysis of minor millets in Bastar district of Chhattisgarh. *International Journal of Agricultural Extension and Rural Development.* 1(4): 101-103.

Verma, P.K. and Mishra, N. (2011). Resource efficiency of ragi(Eleusine coracana) crop in Bastar district of Chattisgarh. *International Journal of Agricultural and Statistical Sciences.* 7(2): 631-634.