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Cost and return analysis of Bajra (Pearl millet) cultivation in Auraiya district of Uttar Pradesh

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Abstract

Pearl millet accounts for almost half of global millet production. Bajra crop is important staple food crop and cereal crop of Auraiya district under the thrust area identified by the Indian Government and cultivation of bajra is given importance. Uttar Pradesh state is second largest with respect of area and production under bajra crop in India. Area, production and productivity of the bajra crop in Uttar Pradesh was 0.93 Mha, 1.80 Mt. and 1941 kg/ha, respectively (Directorate of Economics and Statistics, DAC & FW, 2019). A multi stage stratified random sampling techniques was adopted to select the block, villages, cultivators, market and market functionaries and processing units. The study was confined in Auraiya district of U.P. A total 150 respondent were selected randomly from selected villages (30 farmers from each village). The farmer was further sub grouped, into marginal farmers (0-1 ha.), small farmers (1-2 ha.) and large farmers (2 and above ha) on the basis of land under cultivation. Table 4. Shows that the 36 per cent of total bajra growers were marginal size group, 44 per cent small size group and only 20 per cent in large size group. The average size of holding of marginal, small, and large size group was 0.69, 1.54 and 3.26 respectively. Table 7. Shows that the average cost of cultivation of Bajra crop came to Rs. 85265.78 per farms. The cost of cultivation shows increasing trend with the increasing size of farm. It came to Rs. 27114.46 on marginal farms, Rs. 69796.03 on small farms and Rs. 158886.86 on large farms. The highest average yield 30.39 quintal per hectare was obtained through large size group of farms followed by 28.78 quintal per hectare on small size group of farms and 25.76 quintal per hectare on marginal size group of farms. Average cost of cultivation on bajra large size group of farms Rs. 48738.30 followed by small size group of farm Rs.45322.10 and marginal size group of farms Rs.39296.33 per hectare on bajra cultivation. Maximum net income of Rs.19109.70 per hectare was obtained through large size group of farms followed by Rs.18983.40 per hectare by small size group of farms and lowest net income of Rs.18141.17 per hectare was received by marginal size group of farms on the sample farms.

Keywords: Cost and return analysis, pearl millet, cost concepts, functionaries

Introduction

Millet is a collective-term referring to a number of small seeded annual grasses that are cultivated as grain crops, primarily on marginal lands in dry areas in temperate, sub-tropical and tropical regions. It has various names such as pearl millet, cattail or spiked millet in English. It is known as 'Kambu' in Tamil Nadu, 'Dhukhen' in Arabic and 'Chandelles' in Africa. Pearl millet accounts for almost half of global millet production. The origin of bajra has been traced to tropical Africa. Bajra crop is important staple food crop and cereal crop of Auraiya district under the thrust area identified by the Indian Government and cultivation of bajra is given importance. It is also a rich source of iron and contains more protein.

Bajra (Pearl millet) is a rich source of iron, is the sixth most important millet crop after the wheat, rice, maize, barley and sorghum in the world as one of the millet crops. Bajra is introduced from Africa to India and stands fourth in area after wheat, rice and sorghum. Area, production and productivity of the bajra crop in the world was 28.03 Mha. 21.85 Mt. and 780 kg/ha, respectively (FAOSTAT, 2018). Largest bajra producing countries in the world are India followed by Nigeria, Niger, Sudan and Mali etc. India, contributes 21.85% per cent in total area, and 42.56% percent of the total production of bajra in the world.

Uttar Pradesh state is second largest with respect of area and production under bajra crop in India. Area, production and productivity of the bajra crop in Uttar Pradesh was 0.93 Mha, 1.80 Mt. and 194.1 kg/ha, respectively (Directorate of Economics and Statistics, DAC & FW, 2019).

Bajra crop is grown in Uttar Pradesh where region receives scanty rainfall which is having unpredictable and extremely variable in which bajra is grown extensively as a staple food crop which has ability to withstand the adverse conditions. Uttar Pradesh contributes 12.6% per cent of total area, and 19.7 percent of the total production of bajra in the country. The crop grows well in the western parts of the state with Agra, Badayun, Aligarh, Mathura, Moradabad, Bulandshahar, Manipuri, Etah, Etawah, and Farrukhabad districts as important producers. In Auraiya district the area under bajra crop is 32974 ha, with production of 71519 metric tons and productivity of 2295 kg per hectare in 2017-18 (Source:- District Statistical Bulletin 2018-2019).

Research Methodology

A multi stage stratified random sampling techniques was adopted to select the block, villages, cultivators, market and market functionaries and processing units. A list of all the villages falling under selected block and practicing more bajra cultivation was prepared. The list five villages namely, Pakar ka Purwa Bhartaul, Maharatpur, Gunthi Ka Purwa and Karampur were selected randomly. A total 150 respondent were selected randomly from selected villages (10 gram each). the farmer was further sub grouped, into three size groups of farms viz. marginal farmers (0-1 ha.), small farmers (1-2 ha.) and large farmers (2 and above ha) land under cultivation.

The information furnished by the help of block and village level officer, block development officer (B.D.O) and lekhpal etc. The secondary data were compiled from block head quarter district statistical office, mandi samiti, planning office and other published material, reports and journals. And period of enquiry of the study relates to the agricultural yea. 2019-20. Conventional as well as functional have been used to analyse the data to arrive at valid conclusion. Conventional analysis (Tabular) has been used to arrive at labour requirements, costs and returns and capital requirements on different size group of farms. According to Acharya, an ideal measure of marketing efficiency can be calculated by using the formula: Marketing efficiency = Net selling price of grower / Total marketing cost + Total marketing margin

Result and Discussion

The size of holding occupied by different size groups of farms, bajra growers under different size group and their

average size of holding has been discussed hereafter. Data reveals that 10.66 per cent large farmers occupied by 45.69 per cent of land followed by 14.15 per cent small farmers 22.82 per cent per cent and 75.19 per cent marginal farmers 31.19 land respectively. It shows that the 36 per cent of total bajra growers were marginal size group, 44 per cent small size group and only 20 per cent in large size group. The average size of holding of marginal, small, and large size group was 0.69, 1.54 and 3.26 respectively. It shows uneven distribution of land holding.

Table 1 shows that the average area under Bajra, wheat, Pigeon pea, Mustard and Gram crops is higher in small and large farms as compared to marginal farms due to higher investment capacity of small and large farms for the purchase of cash inputs like quality seed, fertilizer manures and irrigation etc. in comparison to marginal farms.

Table 1: Distribution of total cropped area in the district under different crops

S. No.	Crops	Marginal	Small	Large	Average area
1	Bajra	9.37	22.50	24	18.62
2	Wheat	8.62	20.14	19.86	16.21
3	Pigeon pea	2.41	9.57	6.73	6.24
4	Mustard	3.15	8.36	6.72	6.07
5	Gram	2.71	5.17	6.02	4.63
6	Moong	2.16	1.85	1.37	1.79
7	Paddy	0.70	1.81	1.87	1.46
8	Others	0.98	0.85	1.64	1.16
	Total	30.10	70.25	68.19	56.18

Investment in fixed capital

Investment in fixed capital is the most crucial factor of production affecting farm structure, farm planning and budgeting, efficiency of management, nature and scale of business, benefits and loses of existing enterprises. Capital investment varies to a great extent to the nature degree of farm obligations. The investment in fixed capital refers to investments made by the farmers on Items of permanent assets like land, farm building, irrigation structure, draft and milch animals, implements on different categories of farms on per hectare basis.

Table 2 shows that the total investment on fixed capital per hectare was observed Rs. 2494748.13, Rs. 2619152.17 and Rs. 2772072.95 on marginal, small and large farmers respectively and total average investment on fixed capital per hectare is Rs. 2628657.75. Whereas it was Rs. 82380.94 in marginal, Rs. 111369.81 in small and Rs. 123322.83 in large farms excluding land value.

Table 2: Investment in fixed capital per hectare. (Rs/ha)

S. No	Particulars	Size group (Rs/ha)			
		Marginal	Small	Large	Average
1.	Land	2412367.19	2507782.36	2648750.12	2522966.56
2.	Farm building	7551.52	9330.57	13759.81	10213.97
3.	Livestock	28169.87	36598.32	38630.69	34466.29
4.	Irrigation structure	25243.58	29742.22	32163.49	29049.76
5.	Implement & machinery	20711.11	34780.76	37551.18	31014.35
6.	Others	704.86	917.94	1217.66	946.82
	Total	2494748.13	2619152.17	2772072.95	2628657.75
	Investment (Excluding land Value)	82380.94	111369.81	123322.83	105691.19

Total cost and its item-wise break-up on per hectare basis

Total cost incurred on cultivation of Bajra crop and its break-up on different item i.e. human labour, tractor power, seed,

manures and fertilizers, rental value of land overhead charges, on per ha Basis has been work-out its break-up is given in the table 3.

Table 3: Total cost of cultivation and its breakup

Particulars	Farm size			
	Marginal	Small	Large	Average
(A) Operational Cost)				
(a) Family labour	4468.76	9183.19	12623.80	8758.58
(b) Hired labour	1865.90	6173.46	23397.67	10479.01
Total human labour	6334.66(23.36)	15356.65(22.01)	36021.47(22.67)	19237.59(22.65)
(c) Tractor power charge	3664.55(11.67)	7723.07(11.06)	16712.81(10.52)	92100.15(10.04)
(d) Value of seed	714.45(2.64)	1733.76(2.48)	3962.73(2.49)	2136.98(2.53)
(e) Value of manures and fertilizers	9194.64(8.09)	5902.90(8.46)	13335.71(8.39)	7144.42(8.35)
(f) Value of Plant protection chemicals	517.87(1.91)	1295.89(1.86)	2935.04(1.85)	1582.93(1.87)
(g) Irrigation charge	1045.16(3.86)	3059.92(4.38)	6670.35(4.20)	3591.81(4.16)
(h) Interest on working capital	558.85(2.06)	1402.89(2.01)	3185.51(2.01)	1715.75(2.02)
Total operational cost	14530.18(53.59)	36475.08(52.26)	82883.62(52.13)	44609.63(52.60)
(B) Rental value of owned land	6900(25.45)	16170(23.17)	35860(22.57)	19643.33(23.62)
Overhead cost				
(a) Interest on fixed capital @ 5 per cent per annum	2842.14(10.48)	8575.47(12.29)	20101.62(12.65)	10506.41(11.89)
(b) Repairs of dead stock	1705.28(6.29)	5145.28(7.37)	12060.96(7.59)	6303.84(7.13)
(c) Depreciation value on implement & machinery	1136.86(4.19)	3430.20(4.91)	8040.66(5.06)	4202.57(4.76)
(C) Total overhead cost	5684.28(20.96)	17150.95(24.57)	40203.24(25.30)	21012.82(23.78)
Total Cost	27114.46(100)	69796.03(100)	158886.86(100)	85265.78(100)

Table 3 shows that the average cost of cultivation of Bajra crop came to Rs. 85265.78 per farms. The cost of cultivation shows increasing trend with the increasing size of farm. It came to Rs. 27114.46 on marginal farms, Rs. 69796.03 on small farms and Rs. 158886.86 on large farms. The higher cost on large farms was mainly due to use of more inputs like manures, fertilizers and irrigation charges. Total human labour was slightly higher on large farms being Rs. 36021.47 followed by small and marginal farms being Rs. 15356.65 and Rs. 6334.66 respectively, due to availability more resources as compare to small and marginal farms. The marginal and

small farms had more family labour than that of hired labour. The average total human labour for all size group of the farm came to Rs. 19237.59. Total operational cost was observed to be Rs. 14530.18, Rs. 36475.08 and Rs. 82823.62 on marginal, small and large farms respectively, with overall average operational total cost being Rs. 44609.63 on per farm basis.

Cost and Return from Bajra crop on per hectare basis

The total input cost, gross income, net income, cost of production per quintal and input output ratio has been presented in Table 4.

Table 4: Cost and Return from Bajra crop: (Rs/ha)

S. No.	Particular	Size group of farms (ha)			
		Marginal	Small	Large	Average
1.	Total cost	39296.33	45322.10	48738.30	44452.24
2.	Total yield (qtl.)				
a.	Main product	25.76	28.68	30.39	28.31
b.	By product	39.45	44.97	47.12	43.85
3.	Rate Rs. / Qtl.				
a.	Main product	2000	2000	2000	2000
b.	By product	150	150	150	150
4	Value of main product	51520	57560	60780	56620
5	Value of by product	5917.50	6745.50	7068	6577
6	Gross income	57437.50	64305.50	67848	63197
7	Net income	181141.17	18983.40	19109.70	18744.76
8	Farm business income	38736.68	41015	40148.17	39966.62
9	Family labour income	24617.63	24946.51	22982.03	24182.06
10	Cost of production per Qtl.	1525.47	1574.77	1603.76	1568
11	Input-Output ratio	1:1.46	1:1.42	1:1.39	1:1.42

Table 4 reveals that per hectare main product of Bajra crop was observed to be higher on large farms as 30.39 quintal followed by small and marginal farms being 28.78 and 25.76 quintal per hectare respectively. the per hectare by product of Bajra crop was observed to be higher on large farms as 47.12 quintal followed by small and marginal farms being 44.97 and 39.45 quintal per hectare respectively. The gross income was maximum on large farms being Rs. 67848 as compare to small and marginal farms being Rs. 64305.50 and Rs. 57437.50 respectively. Similarly, per hectare net income shows in increasing trend being Rs. 18141.17 Rs. 18983.40 and Rs.19109.70 on marginal small and large size group of farms respectively.

Total output, gross income and net income received by large farms were greater than marginal and small farms due to better use of available resources adoption of modern agricultural technologies, improved seeds, proper doses of fertilizer and manures, timely and adequate uses of plant protection measures and assured irrigation facility available on the farms.

Cost of cultivation per hectare based on cost concepts

To estimate the cost of cultivation of Bajra crop, the different cost concept i.e. A1, A2, B1, B2, C1 and C2 were used. The cost of cultivation of Bajra crop on the basis of these cost concepts have been in given table 5.

Table 5: Cost of cultivation on the basis of cost concepts. (Rs/ha)

Cost	Size group			
	Marginal	Small	Large	Average
Cost A ₁	18700.82	23290.50	27699.83	23230.38
Cost A ₂	18700.82	23290.50	27699.83	23230.38
Cost B ₁	22819.87	28858.99	33865.97	28514.94
Cost B ₂	32819.87	39358.99	44865.97	39014.94
Cost C ₁	29296.33	34822.10	37738.30	33952.24
Cost C ₂	39296.33	45322.10	48738.30	44452.24

Table 5 reveals that per hectare average cost A₁, (Rs. 23230.38) cost A: (Rs. 23230.38), cost B, (Rs. 28514.94) cost B₂; (Rs. 39014.94), cost C₁ (Rs. 33952.24) and C₂ cost (Rs. 44452.24) were derived respectively. Almost all costs mentioned above in table shows the increasing trend with the increasing size of holdings under the study area.

Income over cost concepts

Table 6 gives an account of the income received from bajra cultivation over different cost concepts. Shows that income over different cost concepts gave an increasing trend with the increase in size of farms. It was due to higher yield and income received by large farmers having higher investment capacity on different input items. The total investment on fixed capital per hectare was observed Rs. 2494748.13, Rs.2619152.17 and Rs.2772072.95 on marginal, small and large farmers respectively and total average investment on fixed capital per hectare is Rs. 2628657.75. Whereas it was Rs.82380.94 in marginal, Rs. 111369.81 in small and Rs. 123322.83 in large farms excluding land value.

Table 6: Income over different cost concepts

S. No.	Particular	Size group			
		Marginal	Small	Large	Average
1.	Gross income	57437.50	64305.50	67848.00	63197.00
2.	Income over cost A ₁	38736.68	41015.00	40148.17	39966.62
3.	Income over cost A ₂	38736.68	41015.00	40148.17	39966.62
4.	Income over cost B ₁	34617.63	35446.51	33982.03	34682.06
5.	Income over cost B ₂	24617.63	24946.51	22982.03	24182.06
6.	Income over cost C ₁	28141.17	29483.40	30109.70	29244.76
7.	Income over cost C ₂	18141.17	18983.40	19109.70	18744.76

Summary and Conclusion

The average size of holding of marginal, small and large size of group of sample holder came to 0.69-hectare, 1.54 hectare and 3.26 hectare respectively. It was observed that 36 per cent of total bajra growers were marginal size group, 44 per cent small size group and only 20 per cent in large size groups. The average size of holding of marginal, small, and large size group was 0.69, 1.54 and 3.26 respectively. The gross cropped areas were 30.10, 70.25 and 68.19 hectares, marginal, small and large farmers respectively. The cropping intensity on marginal farms was 241.18 per cent, 207.35 per cent small and 209.17 large farm.

The average cost of cultivation of Bajra crop came to Rs. 44452.24 per hectare. It came to Rs. 39296.33 on marginal farms, Rs. 45322.10 on small farms and Rs. 48738.30 on large farms. The average cost of cultivation of Bajra crop came to Rs. 85265.78 per farms. It came to Rs. 27114.46 on marginal farms, Rs. 69796.03 on small farms and Rs. 158886.86 on large farms. The per hectare average cost A, (Rs. 23230.38) cost A₂ (Rs.23230.38), cost B (Rs.28514.94) cost B₂ (Rs.39014.94), cost C₁ (Rs. 33952.24) and C₂ cost (Rs. 44452.24) were derived respectively.

The per farm average cost A), (Rs. 46357.46) cost A_y (Rs. 46357.46), cost B_i (Rs. 56863.87) cost B₂ (Rs. 76507.20), cost C, (Rs. 65622.45) and C, cost (Rs. 85265.78) were derived respectively. The highest average yield 30.39 quintal per hectare was obtained through large size group of farms followed by 28.78 quintal per hectare on small size group of farms and 25.76 quintal per hectare on marginal size group of farms. Average cost of cultivation on bajra large size group of farms Rs. 48738.30 followed by small size group of farm Rs.45322.10 and marginal size group of farms Rs.39296.33 per hectare on bajra cultivation. Maximum net income of Rs.19109.70 per hectare was obtained through large size group of farms followed by Rs.18983.40 per hectare by small size group of farms and lowest net income of Rs.18141.17 per hectare was received by marginal size group of farms on the sample farms. The bulk procurement of pearl millet for supply through Public Distribution System (PDS) may be necessary to increase its demand in India. Ultimately area under bajra is expected to increase and it would be possible to bring low fertile land of drought prone area which is large in proportion, can be brought under bajra cultivation in addition to the present area.

Suggested readings

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