An Identification of cost of cultivation and returns of cluster bean in Gird Region of Madhya Pradesh

ABSTRACT

Cluster bean or guar (*Cyamopsis tetragonoloba*) (2n=14) is an annual legume plant widely grown for its gum, vegetable, fodder and green manure values. India produces around 80% of the world's cluster beans. It is the most important crop of drought region, because it has a deep root system and excellent in surviving water stress condition. This research paper was carried out to identify the cost of cultivation and returns of grid region of Madhya Pradesh of cluster bean for the year 2019-20. Multi-stage sampling was used for the selection of the farmers for the present research. Morena district of Madhya Pradesh was selected purposively as its first rank in the area and production of cluster bean in the state. Total 90 farmers were selected and the nearest organized grain mandi of Sabalgarh was selected purposively for this research. Both the primary and secondary data were collected. The results showed that at overall farm level per hectare cost of cultivation of Cluster bean in Morena district was noted Rs.26772.60, Cost A1 at overall farm level was seen Rs16753.22/ha, has been that overall cost of production at cost A1/ A2 was observed Rs1355.50/qt average yield of guar were achieved 12.38 qt/ha Net return at aggregate level under cost A1 A2, B1 ,B2, C1, C2 and C3 were reported Rs 39882.77/ha, Rs 39882.77/ha, Rs 39276.03/ha, Rs 29863.36/ha, Rs 37079.88/ha, Rs 27667.21/ha and Rs 27377.52 /ha, the B;C ratio over cost A1 Rs3.37, A2 Rs3.37, B1 3.25, B2 2.10, C1 2.88, C2 1.94, and C31.92 was observed. B; C ratio overall farm level was seen 1.92 referred crop is under profitable situation.

INTRODUCTION

Cluster bean or guar (*Cyamopsis tetragonoloba*) (2n=14) is an annual legume plant widely grown for its gum, vegetable, fodder and green manure values. West Africa and India are mentioned as center's of origin for cluster bean by various authors. The crop is cultivated extensively in India, Pakistan, Indonesia, Myanmar, parts of Central Africa and in the arid South Western United States to tap its industrial potential, especially for the extraction of gum from the guar seed. In India, two cultivars of guar are generally under cultivation i.e. Giant and the Dwarf types; the former possesses large pods and seeds along with vigorous growth characteristics. Cluster beans are grown in India for a variety of purposes, including as a vegetable, for cattle feed, and as a source of gum. Here are some things to know about cluster bean cultivation in India. India produces around 80% of the world's cluster beans. It is the most important crop of drought region, because it has a deep root system and excellent in surviving water stress condition. The beans are grown mainly during the Kharif season and stimulated the

economic growth of traditional crops that grow fully in distant areas, mainly for human beings and animal food. It is useful to industrial use such as food, cosmetics, printing along with textile companies. The gum, also known as guar gum, is exported to other countries. Asian countries are one of the largest producers of green beans, accounting for 82% of the total production of the land. In India, cluster bean is grow on 4.26 million hectares along with a production of 2.2 million tonnes with average yield of 567 kg/ha(Anonymous, 2018).In Madhya Pradesh it is cultivated an area of 70,622 hectares as a sole crop in 70566 hectares and as a mixed crop on 54,782 hectares. About 80% of the state is in the Gird region In Madhya Pradesh; it is cultivated as a major crop in four districts: Gwalior, Shivpuri, Morena, and Bhind. The current area of this crop in these districts 2,500, 3,000, 3,500, and 2,100 hectares, respectively. Guar is a drought-tolerant, sun-loving plant, so farmers in these areas grow a lot. As the demand for guar gum increases day by day, increasing this acreage becomes a priority to meet future needs. The National Seed Corporation does not produce large amounts of seed as it is not considered a major crop in the country. Farmers often use guar gum or seeds purchased from private growers, and the yields recommended by researchers are relatively low, but the area cultivated has declined in recent years due to industrialization and urbanization.

METHODOLOGY

Multi-stage sampling was used for the selection of the farmers for the present study. The sampling in the first three stages was purposive while the selection of farmers was random. Morena district of Madhya Pradesh was selected purposively as its first rank in the area and production of cluster bean in the state. Morena district comprises seven blocks namely Ambah (78), Morena (533), Porsa (161), Joura (2444), Kailshgrah (146), Pahargarh (466), and Sabalgarh (3828), ha. Out of which, Sabalgarh block has maximum area under of cluster bean so that Sabalgarh block was selected for this study. A list of cluster bean grower villages was prepared with the help of revenue department. Then (10) villages from the selected block were randomly selected for the present study. Separate list of all the cluster bean growers of each of the selected villages along with their size of operational holdings was prepared. After that 3 farmer from each category (small <2 ha, Medium 2-4 ha, large >4 ha) i.e. 9 farmers (3×3) from each village was selected randomly. So that total 90 farmers (10×9) were selected for present study. The nearest organized grain mandi of Sabalgarh was selected purposively for present research purpose of marketing cost. Two village traders from each village and two

wholesalers from regulated market of Sabalgarh were selected on the basis of their responsiveness. The primary data was collected from selected farmers and market intermediaries through pre-structured schedule on cost of cultivation, marketing costs, price spread and constraints faced by respondents in marketing of cluster bean. The secondary data were collected from agriculture Mandi of Sabalgarh and from Government publication of the Directorate of Economics and Statistics Government of Madhya Pradesh. The primary data was collected for the year 2019-20.

Analytical tools

The cost of cultivation of cluster bean crop was worked out by using various cost concepts defined below

Cost A_1: it include

1. Value of hired labour.
2. Value of owned bullock labour.
3. Value of hired bullock labour.
4. Value of owned machine labour.
5. Value of hired machine labour.
6. Value of owned seeds.
7. Value of purchased seeds.
8. Value of owned farm yard manure.
9. Value of purchased farm yard manure.
10. Value of fertilizer and insecticides.
11. Irrigation charges.
12. Land revenue.
13. Interest on working capital.
14. Depreciation.
15. Miscellaneous charges.

Cost A_2 : Cost A_1 + rent paid for leased in land.

Cost B_1 : Cost A_1+ interest of fixed capital (excluding land)

Cost B_2 : Cost B_1 + rental value of owned land + rent for leased in land.Cost

C_1 : Cost B_1 + imputed value of family labour.

Cost C_2 : Cost B_2 + imputed value of family labour.

Cost C_3 : Cost C_2 + 10 per cent of cost C_2 as management cost.

The Cost of Production will be worked out by using FollowingFormula:

It is the ratio of total cost incurred on cluster bean production and physical output obtained on the sample farms.

$$\text{Cost of production (Rs/ha)} = \frac{\text{Cost of cultivation (qt./ha)}}{\text{Quantity of main product (qt./ha)}}$$

Estimation of Return

Following income measure was used to work out the net return of Cluster bean cultivation in the study area.

Gross income:

The value of output (both main and by-product) evaluated at harvest prices.

GI = Qm x Pm + Qb x Pb

Where,

GI = Gross income
Qm = Quantity of main product
Pm = Price of main product
Qb = Quantity of by- product
Pb = Price of by- product

Net income = Gross income - Cost C_3 (Total cost of cultivation)

RESULT and DISCISSION

ESTIMATION OF COST AND RETURNS FROM CLUSTER BEAN PRODUCTION

The different cost incurred in the cultivation of Cluster beans in different sizes of farms is presented in table 1 the table depicted that at overall farm level per hectare cost of cultivation of Cluster bean in Morena district was noted Rs.26772.60. It was found a maximum Rs.28900.30 on large farm, followed by Rs.26843.51 on medium, and Rs.24574.10 on a small farm which indicated that the total cost of cluster bean production increase as increase size of the farm due to large farmer the spending more cash expense on variable inputs. In the cost of cultivation of cluster among variable cost highest cost shared by seed (Rs 6530/ha), followed by machine labor (Rs 3270.17/ha), the imputed value of family labor (Rs1828.67/ha), manure and fertilizer (Rs1416/ha), plant protection (Rs 194.72) and irrigation (Rs62.96/ha) and less cost on irrigation due to crop mainly depends on rain for irrigation while in the fixed cost highest cost share by rental value of owned land. (Rs 9412.67/ha).

Table 1 Cost of cultivation of cluster bean at different size of farm Rs/ha

Item	Size of holdings			
	Small	Medium	Large	Overall

Fertilizer	521.50 (2.12)	556.50 (2.07)	582.50 (2.02)	553.50 (2.07)
Hired labour	611.60 (2.49)	1160.40 (4.32)	1742.40 (6.03)	1171.47 (4.38)
Expenses on Machine labour	3076.50 (12.52)	3283.00 (12.23)	3451.00 (11.94)	3270.17 (12.21)
Farm yard manure	802.50 (3.27)	861.50 (3.21)	917.50 (3.17)	860.5.00 (3.21)
Seed	6065.00 (24.68)	6507.50 (24.24)	7017.50 (24.28)	6530.00 (24.39)
Impute value of family labour	2250.40 (9.16)	1873.60 (6.98)	1362.00 (4.71)	1828.67 (6.83)
Plant protection chemical	170.84 (0.70)	193.98 (0.72)	219.34 (0.76)	194.72 (0.73)
Expenditure on Irrigation	57.60 (0.23)	61.39 (0.23)	69.89 (0.24)	62.96 (0.24)
Depreciation	622.20 (2.53)	656.04 (2.44)	700.62 (2.42)	659.62 (2.46)
Land revenue	40.00 (0.16)	40.00 (0.15)	40.00 (0.14)	40.00 (0.15)
Other	500.00 (2.03)	650.00 (2.42)	750.00 (2.60)	633.33 (2.37)
Interest on working capital	883.08 (3.59)	950.64 (3.54)	1011.16 (3.50)	948.29 (3.54)
Interest on fixed capital	545.38 (2.22)	608.21 (2.27)	666.64 (2.31)	606.74 (2.27)
Rental value of land	8427.50 (34.29)	9440.75 (35.17)	10369.75 (35.88)	9412.67 (35.16)
Total cost	**24574.10 (100)**	**26843.51 (100)**	**28900.30 (100)**	**26772.60 (100)**

(Source: Primary data 2019-20 and Figure in parentheses shows % of total cost

Cost of cultivation under various cost concepts

The different costs are presented in table 2 it was depicted from data that Cost A1 at overall farm level was seen Rs16753.22/ha, it was found highest on the large farm (Rs17863.91/ha) and lowest on the small farm (Rs15601.22/ha). It indicating that increasing trend observed in cost A1 Cost A2 was observed same in all farm sizes indicating leasing patterns were not adopted in the study area. Cost B1 and B2 C1 C2 C3 has been observed Rs17359.97/ha, Rs19711.63/ha, Rs29124.09/ha, and Rs29415.33/ha respectively.

Table 2: Cost of cultivation of cluster bean at different cost in Rs/ha

Cost	Small	Medium	Large	Overall
A_1	15601.22	16794.55	17863.91	16753.22
A_2	15601.22	16794.55	17863.91	16753.22
B_1	16146.60	17402.76	18530.55	17359.97
B_2	24574.10	26843.51	28900.30	26772.63
C_1	18397.00	19801.05	20470.31	19711.42
C_2	26824.50	29241.80	30840.06	29124.09
C_3	27092.75	29534.22	31148.46	29415.33

(Source: Primary data 2019-20)

Cost of production of cluster beans on different sizes of farms

The cost of production of cluster bean under different sizes of farm and the overall farm was calculated and the results are shown in Table It has been that overall cost of production at cost A1/ A2 was observed Rs1355.50/qtl and was increased as increase cost viz Rs1401.49 /qtl, Rs2164.30 /qtl, 1583.70/qtl, Rs2443.50 /qtl over cost B 1, B2, C1, C2 respectively.

Table 3: Cost of production of cluster bean in (Rs/qt)

Cost	Small	Medium	Large	Overall
A_1	1399.21	1348.95	1318.36	1355.50
A_2	1399.21	1348.95	1318.36	1355.50
B_1	1448.12	1397.81	1367.56	1404.49
B_2	2203.95	2156.10	2132.86	2164.30
C_1	1649.95	1590.44	1510.72	1583.70
C_2	2405.78	2348.73	2276.01	2343.50

(Source: Primary data 2019-20)

Profitability of cluster bean production

It was seen from table 4 that at average yield of guar were achieved 12.38 qt/ha which was maximum under large farm (13.55 qt/ha), followed by medium farm (12.45 quintals) and small farm (11.15 qtl/ha), and the gross income at overall level was observed Rs 56636.00/ha which was highest on large farm after that by medium and small Rs62458.50/ha, Rs58884.50/ha, Rs50565.00/ha respectively.

Table 4: Per hectare profitability of cluster bean at different sizes of farm

Size of farm	Yield (qtl/ha)	Price (Rs/qtl)	Production of by product (qtl/ha)	Price of by Product (Rs/qtl)	Gross income (Rs/ha)
Small	11.15	3750	19.45	450	50565.00
Medium	12.45	3750	22.66	450	56884.50
Large	13.55	3750	25.88	450	62458.50
Overall	12.38	3750	22.66	450	56636.00

Net return over different cost in cluster bean production

Net return at aggregate level under different costs was calculated and results are presented in the table 5 Net return at aggregate level under cost A1 A2, B1B2, C1, C2 and C3 were reported Rs 39882.77/ha, Rs 39882.77/ha, Rs 39276.03/ha, Rs 29863.36/ha, Rs 37079.88/ha, Rs 27667.21/ha and Rs 27377.52 /ha respectively. Across categories, net return was noted Rs 23472.25/ha, Rs 27350.28/ha, and Rs 31310.04 /ha on small, medium, and large farm sizes respectively.

Table 5: Net return over different cost in cluster bean production

Cost	Small	Medium	Large	Average
A_1	34963.78	40089.95	44594.59	39882.77
A_2	34963.78	40089.95	44594.59	39882.77
B_1	34418.40	39481.74	43927.95	39276.03
B_2	25990.90	30040.99	33558.20	29863.36
C_1	32168.00	37083.45	41988.19	37079.88
C_2	23740.50	27642.70	31618.44	27667.21
C_3	23472.25	27350.28	31310.04	27377.52

(Source: Primary data 2019-20)

Benefit cost Ratio over different cost

Return from one rupees investment was calculated under the different sizes of farm and the results are presents in table 6 depicted that B;C ratio over cost A1 Rs3.37, A2 Rs3.37, B1 3.25, B2 2.10, C1 2.88, C2 1.94, and C31.92 was observed. Outcome from 1 rupee invest were found highest on large farm ie. Rs2.0 followed by on medium Rs1.92 and small farms rupay1.86.

Table 6: Benefit cost ratio over different cost in cluster bean

Cost	Small	Medium	Large	Average
A_1	3.24	3.38	3.49	3.37
A_2	3.24	3.38	3.49	3.37
B_1	3.13	3.26	3.37	3.25
B_2	2.05	2.11	2.16	2.10
C_1	2.74	2.87	3.05	2.88
C_2	1.88	1.94	2.02	1.94
C_3	1.86	1.92	2.00	1.92

(Source: Primary data 2019-20)

SUMMARY & CONCLUSION

Per hectare cost of cultivation of Cluster bean in Morena district was noted Rs 26772.60. It was found a maximum of 28900.30 on large, Rs.26843.51 on medium, and Rs. 24574.10 on a small farm which indicated that the total cost of cluster bean production increase as increase size of the farm due to the spending more cash expense on variable inputs. Among Variable cost highest cost share by seed (Rs 6530), followed by machine labor (Rs 3270.17), the imputed value of family labor (Rs 1828.67), manure and fertilizer (1416.00) plant protection (194.72), and irrigation (62.96). Cost A1 on an overall basis was seen at Rs16753.22. it was found highest on the large farm (Rs17863.91) and lowest on the small farm (Rs15601.22). The increasing trend observed in cost A1 Cost A2 was observed the same in all farm sizes indicating leasing patterns were not adopted in the study area. The overall cost of production at cost A1 / A2 was observed 1355.50. The yield of guar at aggregate level has been seen 12.38 qt. The gross income at the overall level was observed Rs 56636.00/ha which was highest on the large farm (Rs 62458.50) followed by medium (Rs 58884.50) and small (Rs 50565.00). At overall level net return over cost A1, A2, B1, B2, C1, C2 and C3 were found Rs39882.77/ha, Rs39882.77/ha ,Rs39276.03 /ha , Rs29863.36 /ha, Rs 37079.88 /ha, Rs27667.21/ha and Rs 27377.52 /ha respectively. Across categories, net return noted Rs 23472.25/ha, Rs27350.28/ha, and Rs31310.04/ha on small, medium, and large farm sizes respectively. B; C ratio overall farm level was seen 1.92 referred crop is under profitable situation. After the analysis of data, it was concluded that total cost increase as the size of holding increase due to large farmer spends more expenses on variable inputs. Among variable input, seed share maximum cost in variable inputs. Production and gross income were highest on the large farm as compared to small and medium in cluster bean production in the study area.

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