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ECONOMICS OF GREEN GRAM PRODUCTION IN AHMEDNAGAR DISTRICT OF MAHARASHTRA

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Abstract: *Green gram plant is a small herbaceous, it grows in a wide range of climatic conditions. A warm humid climate with temperature range from 25°C to 35°C. The present study was intended to depict the picture of green gram growing enterprise in Ahmednagar district of Maharashtra state. The investigation was carried out with a view to examine the resource use structure, estimate per hectare costs and returns, productivity and efficiency in greengram cultivation in Ahmednagar district of Maharashtra. The total sample consisted of 90 green gram growers and data pertaining to the year, 2017-18 were collected by personal interviews. The simple statistical tools and the Cobb Douglas production function was fitted to the data.*

Result indicated that, at overall level per hectare cost 'A', 'B' and 'C' were ₹ 24841.21,₹ 38294.47 and ₹ 41637.98, respectively. The productivity were to the extent of 8.96 q and per quintal cost was ₹ 4647.09. The average per hectare net profit at cost C were ₹ 11735.39. The input output ratio at cost C was 1.28 at overall level indicating green gram cultivation is profitable enterprise. The average per hectare yield and gross returns were maximum on large and medium farms. The major items of cultivation cost were machine charges, rental value of land, seed, fertilizer and manures. It is observed that the resource use productivities in green gram cultivation for different size group of farms, at overall level human labour (X1), manure (X4), nitrogen (X5), and phosphorous (X6) found significant. While, nitrogen (X5) and phosphorous (X6) found significant at all size group. At overall level, ratio of resource use efficiency found greater than one in case of human labour (X1), manure (X4), nitrogen (X5) and phosphorous (X6).

The study suggests that extension education programs should be strengthened for the spread the awareness of improved production technologies and modern cultivation of green gram among the farmers in order to improve the productivity of green gram.

Keywords: *Green gram, Cobb-Douglas production function, resource use productivity, resource use efficiency, MVP to MC.*

Introduction

Green gram plant is a small herbaceous, annual with a twining habit. Plant grows up to 45-60 cm depending upon the type and nature of crop, it grows in a wide range of climatic conditions. A warm humid climate with temperature range from 25°C to 35°C, with moderate rains of 80-10 cm, well distributed during growing period of 100 days, is quite suitable for its cultivation. Green gram contains about 24 percent protein, this being about two third of the protein content of soybean, twice that of wheat and thrice that of rice. Green gram has high digestibility and palatability; its pods are used as green vegetable. Its whole grains and split grains are used as dal and curry.

Green gram output accounts for about 10 per cent of the total pulse production in the country. (Ministry of Agriculture, GOI, 2017). Rajasthan, Maharashtra, and Karnataka state has major share in produce of green gram. In Maharashtra Jalna district stands first in production, followed by Ahmednagar district (GOM, 2017). Ahmednagar district is endowed with semi- geographically advantage and contributes well towards agriculture production. The major varieties grown in study area are Selection-4, PusaBaisakhi and Shining moong (China moong), Kopergaon-1.

Objectives

1. To estimate costs of cultivation of green gram.

2. To estimate the resource use productivity and resource use efficiency.

Methodology

The study is based on the primary data collected from the 90 farm families in Ahmednagar distract pertain for the agricultural year, 2017-18. Three stage randomized sampling method with special designed questionnaires was used for selection of the samples. The Pathardi and Nagar tehsils were selected based on maximum area under green gram. Then, three villages from each of these tehsils were selected randomly. Five green gram growers from each size group of small, medium and large was selected in each village. Thus, the total sample was 90 farmers selected randomly. Comprising 30 small, 30 medium and 30 large samples on their operational holdings (Small farmers- below 1.00 ha, medium farmers- 1.01 to 2.00 ha, Large farmers above 2.01ha.). In the present investigation, the data was compiled and analyzed, with simple statistical tools such as arithmetic mean average, percentage and ratios were used. Costs are calculated as per the standard format of cost of cultivation i.e. Cost-A, Cost-B and Cost-C.

Functional analysis

To estimate the resource use productivity, Cobb- Douglas production function of the following type was used.

$$Y = ax_1^{b1}x_2^{b2}x_3^{b3}x_4^{b4}x_5^{b5}x6^{b6}e^{u}$$

Where,

Y= Output of main produce (q/ha)
X_1 = Human labour (man days/ha)
X_2 = bullock labour (pair days/ha)
X_3 = Machinery (hr/ha)
X_4 = Manures (q/ha)
X5= N quantity in (kg/ha)
X_6 = P quantity in (kg/ha)
A = Constant / intercept
b^i= Regression coefficient of respective resource variable
e^u = Error term

Estimation of Marginal Value Product

The marginal value products (MVPs) of the individual resource was estimated and compared with the marginal cost (MC). The MVP of individual resource was estimated by using the following formula,

$$\mathbf{MVP} = \left(bi\frac{\overline{Y}}{\overline{Xi}}\right)\mathbf{Py}$$

Where,

bi =Production elasticity corresponding to the i^{th} input
$\overline{Y}$ =Geometric mean of output
$\overline{X}i$ =Geometric mean of i^{th} input
Py =Price per unit of output

If the ratio of MVP/MC is more than one then the resource is used more efficiently and if ratio is less than one then the resource is used less efficiently

Results and Discussion

Cost of cultivation of green gram

Per hectare cost of cultivation of green gram on sample farms has been estimated and the same was represented in the **Table 1.** At the overall level, per hectare cost of cultivation of green gram (i.e. cost 'C') was worked out to ₹ 41637.98. Among the different items of cost machinery charges and rental value of land were the highest (29.71 and 21.36 per cent, respectively).

In the cost of cultivation, the cost 'A' was ₹ 24841.21 and cost 'B' was ₹38294.47 at the overall level. Among the items of costs, the main items were machinery charges and rental value of land (29.71 and 21.36 per cent, respectively).

The other important items of cost were bullock labour (8.37 per cent), followed by family female and male labour (6.49 and 1.53 per cent respectively). Fertilizers charges i.e. N and P were 0.35 and 0.43 per cent, respectively. The interest on fixed capital (10.96 per cent), manures (3.53 per cent), interest on working capital (3.10) were also the major items of cost. The costs incurred in respect of land revenue, other taxes and depreciation were negligible in the cost of cultivation.

Thus, from above discussion it was noticed that, the cost of cultivation varied among the size

groups of green gram growers. The average per hectare productivity of green gram was 8.96 quintals at the overall level. It was highest in large size group (9.94 qt.), followed by medium and small size group (9.05 and 7.90 respectively.) of green gram growers. As a result, the cost required for the production of one quintal of green gram was lowest in large size group (₹ 4505.93), followed by medium and small sized group of green gram growers. This was because of appropriate production management practices adopted by large size group of green gram growers. Per hectare gross returns were highest in large size group (₹59087.33), followed by medium and small size group (₹54101.08 and ₹ 47074.61 respectively.) of green gram growers. The B:C ratio was highest in large (1.31) followed by medium (1.26),and small (1.25) sized groups, respectively. It was seen that large size group of green gram growers received more profit followed by medium size group and small size group of green gram growers, respectively. This was because of higher net price realized by green gram growers in large size group. These results are in consonance with the findings of Asmatoddin *etal,* (2009), Kamble *etal,* (2015) and More *etal,* (2015).

Resource use productivities in production of green gram

The results of resource use productivities in production of green gram are presented in **Table 2.**

Small Farmers Group

The value of coefficient of multiple determination R^2 was found to be 0.91 that means, 91.00 per cent variation in output was jointly explained by the six independent resource variables under consideration. The regression coefficient of variable, human labour (X_1) was found significant at five per cent, while, nitrogen (X_5) and phosphorous (X6) were found significant at one per cent. It means, there was scope for increasing input use of human labour, nitrogen and phosphorous. For every one per cent increase inhuman labour (X_1), nitrogen (X_5) and phosphorous (X6), would result in increased yield by 0.10, 0.89 and 0.08per cent, respectively.

Medium Farmers Group

The estimated parameters of, which nitrogen (X_5) and phosphorus (X_6) were significant at 1 per cent. It indicating that for every one per cent increase in the use of nitrogen (X_5) and phosphorus (X_6) would result in increased yield by 0.47 per cent and 0.11 per cent, respectively. It means, there was scope for increasing input use of nitrogen and phosphorus. The value of coefficient of multiple determination R2 was found to be 0.85 that means, 85.00 per cent variation in output was jointly explained by the six independent resource variables under consideration.

Large Farmers Group

In case of large size group of holding the value of coefficient of multiple determination R^2 was found to be 0.78 that means, 78.00 per cent variation in output was jointly explained by the six independent variables under consideration. The estimated parameters of human labour (X_1), nitrogen (X_5) and phosphorous (X6) were significant at one per cent. While, manure (X4), found significant at 5 per cent. It indicating that for every one per cent increase in the use of human labour (X_1),manure (X4)nitrogen (X_5) and phosphorous (X6) would result in increased yield by 0.55, 0.05, 0.12and 0.06 per cent, respectively.

Overall Level

At the overall level, coefficient of multiple determination (R^2) turned out to be 0.84 indicating that 84.00 per cent variation in output was jointly explained by the six considered independent factors. The regression coefficient of variables human labour(X_1), nitrogen (X_5),and phosphorous (X_6), were turned out statistically significant at 1 per cent and the regression coefficient of the manure (X4) was significant at 5 per cent, this indicated that, one per cent increase in the human labour (X_1),manure (X4), nitrogen (X_5) and phosphorous (X_6), would result into 0.20, 0.17, 0.34 and 0.15 per cent, increase in the output respectively. These results are in similar with the findings of Asmatoddin *etal,* (2009), Kamble *et al,* (2015) and More *etal,* (2015) .

Resource use efficiency in green gram

An efficiency of resource use in green gram production on the sample farms was judged with the help of MVP/MC ratio and the results of resource use efficiency are presented in **Table 3**. It was observed that the marginal value product to factor cost ratio at overall level and also large size group (MVP/MC) were greater than unity in case of human labour (X_1), manure (X4), nitrogen (X_5) and phosphorous (X_6).

In small and medium size group, nitrogen (X_5) and phosphorous (X_6), indicating ratio more than one. While, machine labour shown negative value in all size groups, implying over utilization of these input. This ratio was greater than unity indicating that efficient utilization of the resources and ratio less than unity indicating the inefficient utilization of these resources. While the negative value shows over utilization.

Conclusions

Result indicated that per hectare cost of cultivation of green gram was the highest on large size farms and lowest on small size farms. In which machine, rental value of land, hired human labour, fertilizers, bullock labour, manures, seeds were the major items of cost. The cost of cultivation varied according to the size groups of green gram growers. Green gram was found to be in profit and average per hectare profit was realized to ₹ 11735.59. At the overall level input -output ratio at the total cost of cultivation was 1.28.

In case of the resource use productivities in green gram cultivation for different size group of farms, it was observed that human labour (X_1), manures (X_4), nitrogen (X_5), phosphorus (X_6) were found significant at overall level. The resource use efficiency of the input like human labour (X_1), manures (X_4), nitrogen (X_5), and phosphorus (X_6) was found to be more than unity at overall level. This implied that, higher resource use efficiency was achieved in case of these variables. Hence need to train the farmer regarding use of different inputs in a manner to optimize yield.

Table 1: Cost of Cultivation of Green Gram (₹/ha)

Sr. No	Cost items	Size Groups											
		Small			Medium			Large			Overall		
		Qty.	Value	%	Qty.	Value	%	Qty.	Value	%	Qty.	Value	%
1	**Hired Human labour (Man-days)**												
	a) Male(man days)	1.44	216.67	0.57	1.24	185.57	0.43	3.82	573.03	1.28	2.92	438.18	1.05
	b) Female(man days)	0.31	31.11	0.083	1.24	123.71	0.29	3.82	382.02	0.85	2.80	280.05	0.67
2	Bullock pairs(days)	5.13	3080.00	8.24	5.92	3552.00	8.32	6.30	3780	8.43	5.78	3468	8.37
3	Machine(hr.)	10.51	10511.11	28.13	12.3	12300.0	28.24	14.2	14200.0	31.70	12.33	12330.3	29.71
4	Seed's (Kg.)	15.45	2781.20	7.45	16.75	3015	7.06	17.54	3137.2	7.004	15.91	2863.8	6.73
5	Manures (q.)	5.14	1542.00	4.13	6.24	1872	4.48	3.37	1011.62	2.25	4.91	1473	3.53
6	Fertilizers (Kg.) N	7.87	128.57	0.35	8.96	146.31	0.35	9.2	150.23	0.33	8.67	141.58	0.35
	P	6.21	155.17	0.42	7.25	181.17	0.45	7.92	197.92	0.46	7.12	177.92	0.43
7	Incidental charges (₹)		168.44	0.45		157.73	0.39		194.38	0.45		182.45	0.44
8	Repairs (₹)		164.44	0.44		152.58	0.38		173.03	0.38		167.00	0.40
	Working capital(₹)		**18778.71**	50.26		**21686.07**	**50.2**		**23799**	**53.13**		**21522.2**	**51.68**
9	Int.on working capital(₹)		1080.46	2.90		1301.16	3.05		1429.16	3.20		1291.31	3.10
10	Depre.on farm implements(₹)		2882.22	7.72		1845.97	4.32		1852.88	4.14		1960.80	4.72
11	Land revenue and taxes(₹)		50.00	0.13		65.57	0.41		66.97	0.15		67.15	0.16
	Cost 'A'		**22791**	61.01		**24898.77**	**57.72**		**27148.01**	**60.62**		**24841.5**	**59.66**
12	Rental value of land(₹)		7845.76	21.00		9049.49	21.41		9847.88	21.98		8895.56	21.36
13	Int. on fixed capital @ 10 % (₹)		3409.90	9.12		5380.61	12.61		4433.74	9.90		4557.67	10.96
	Cost 'B'		**34046.66**	91.13		**39328.87**	**92.51**		**41429.77**	**92.50**		**38294.7**	**91.98**
14	Family labour												
	a. Male(man days)	5.57	835.00	2.23	3.71	556.70	1.30	4.27	640.45	1.43	4.27	640.23	1.53
	b. Female(man days)	24.68	2467.78	6.64	27.63	2762.89	6.47	27.19	2719.10	6.07	27.03	2703.28	6.49
	Cost 'C'		**37369.44**	**100**		**42648.46**	**100**		**44789.32**	**100**		**41638.2**	**100**
	Output and income(₹)	7.90	47074.6		9.05	54101.0		9.94	59087.3		8.96	53373.3	
	Per quintal cost (₹)		**4730.30**			**4712.53**			**4505.93**			**4647.09**	

	B:C ratio		**1.25**			**1.26**			**1.31**			**1.28**	

Table 2: Results of resource use productivities

Sr. No.	Particulars	unit	Size groups			
			Small N=30	**Medium N=30**	**Large N=30**	**Overall N=90**
	Intercept		0.03 (0.04)	0.21 (0.10)	0.17 (0.22)	0.13 (0.09)
1	Human labour(X_1)	Days	0.10** (0.04)	0.02 (0.10)	0.55*** (0.13)	0.20*** (0.048)
2	Bullock labour(X_2)	Days	0.008 (0.007)	-0.003 (0.01)	0.009 (0.04)	-0.008 (0.01)
3	Machine (X_3)	Hr.	-0.002 (0.004)	-0.0001 (0.007)	-0.009 (0.01)	-0.002 (0.006)
4	Manure(X4)	t.	0.004 (0.08)	0.02 (0.14)	0.05** (0.02)	0.17** (0.08)
5	Nitrogen (X_5)	Kg	0.89*** (0.06)	0.47*** (0.13)	0.12*** (0.04)	0.34*** (0.06)
6	Phosphorus(X_6)	Kg	0.08*** (0.01)	0.11*** (0.03)	0.06*** (0.02)	0.15*** (0.05)
7	R^2		**0.91**	**0.85**	**0.78**	**0.84**

*, **, ***---significant at 10 per cent, 5per cent and 1 per cent respectively

Table 3: Resource use efficiency in green gram

Sr. No.	Particulars	Unit	bi value	MP	MVP	MC	MVP/ MC
SMALL							
1	Human labour	Man days	0.1078	0.0266	158.58	125.00	1.27
2	Bullock labour	Days	0.0083	0.0128	76.16	600.00	0.128
3	Machine labour	hr.	-0.002	-0.0015	-8.96	1000.0	-0.0090
4	Manures	Tone	0.0047	0.0072	43.07	300.00	0.143
5	N	Kg.	0.8943	0.8982	5352.3	16.66	321.27
6	P	Kg.	0.0852	0.1085	646.71	25.00	25.86
MEDIUM							
1	Human labour	Man days	0.0228	0.0061	36.72	125.0	0.293
2	Bullock labour	Days	-0.003	-0.0052	-31.16	600.0	-0.051
3	Machine labour	hr.	-0.0001	-0.0001	-0.53	1000	-0.0005
4	Manures	Tone	0.0297	0.0449	268.35	300	0.894
5	N	Kg.	0.4767	0.4815	2878.5	16.66	172.78
6	P	Kg.	0.4348	0.5428	3245	25.00	129.80
LAGRE							
1	Human labour	Man days	0.5519	0.1403	834.16	125.0	6.6733
2	Bullock labour	Days	0.0093	0.0147	87.65	600.0	0.1461
3	Machine labour	hr.	-0.009	-0.0064	-38.28	1000	-0.0383
4	Manures	Tone	0.0547	0.1616	960.76	300.0	3.2025
5	N	Kg.	0.1284	0.1388	824.84	16.66	49.510
6	P	Kg.	0.0623	0.0783	465.19	25.00	18.607
OVERALL							
1	Human labour	Man days	0.2011	0.0487	289.92	125.00	2.319
2	Bullock labour	Days	-0.0082	-0.0127	-75.72	600.00	-0.126
3	Machine labour	hr.	-0.0024	-0.0017	-10.39	1000.0	-0.010
4	Manures	Tone	0.1782	0.3812	2270.59	300.0	7.568

5	N	Kg.	0.3425	0.3540	2108.74	16.66	126.57
6	P	Kg.	0.1515	0.1906	1135.62	25.00	45.42

References:

Asmatoddin, M. S, V.Jawale, J. N Ghulghule, J. B. Tawale,. 2009: Resource productivity and resource use efficiency in Pulses production on medium farm in Marathwada. International Journal of Agricultural Science, 5(2): 359-362.

Bhosale, S.B. 2001. Economics of production and marketing of red gram in Osmanabad district. Unpublished M.Sc. (Agri.) thesis, submitted to M.P.K.V., Rahuri (MS).

Gavali, A.V., T.B. Deokate and S.B. Sapkal. 2015. Resource Use Efficiency of Selected Pulses in Maharashtra. Agricultural Economics Research Review, 28(23) : 331.

Inbasekar, K. 2014. Pulses Production in India: Challenges and Strategies. Economic Affairs, 59(3) : 403-419.

Joshi P.K and Raka Saxena. 2002: A Profile of Pulses Production in India: Fact, Trends and Opportunities. Indian Journal of Agricultural Economics, 57(3): 326-339.

Kamble, B.H, A.V. Gavali and T. B. Deokate 2015: Regional Variations in Pulse Cultivation in Maharashtra. Agricultural Economics Research Review, 28 (23): 337.

More, M.S. J.L.Katkade and R.V. Chavan 2015: Economics of Production of Greengram in Parbhani district. Maharashtra Journal of Agricultural Economics, 19 (1): 124.

Pawar, B. R and D. B Pawar 2007: Technique of evaluation in economics of rainfed blackgram and greengram production. International Journal of Agri. Science, 3(1): 21-24.

Pawar, N. D. 2004: Economic of Production and Resource use Productivity of Blackgram in Vidarbha Region., Journal of Maharashtra Agricultural University,31(1): 100-103.