



ECONOMICS OF GREENGRAM PRODUCTION IN MAHARASHTRA

Bondar U. S.¹, Satpute S. V.², Shinde H. R.³ and Mali B. K.⁴

¹Senior Research Assistant, ²Junior Research Assistant ³Assistant Professor ⁴Associate Professor
Department of Agril. Economics, MPKV, Rahuri, Maharashtra

Received: 29/07/2017

Edited: 04/08/2017

Accepted: 11/08/2017

Abstract: *Greengram plays an important role in crop rotation, mixed and inter-cropping and maintaining soil fertility. The present study is an attempt to analyze resource use structure, productivity and efficiency in greengram cultivation. The data were related to greengram output and inputs collected from office record of State Cost of Cultivation Scheme, Govt. of Maharashtra, during the year 2013-14. The total sample size was 138. The simple statistical tools and the Cobb Douglas production function was fitted to the data. Result indicated that at state level, the per hectare use of human, bullock, machine power and seed utilization indicated that irrespective of region, use of these resources was more or less same on region and state level of greengram grower. The per hectare manure utilization is less than the recommended dose 50 q/ha. due to the non-availability and increasing cost of manures. Whereas use of chemical fertilizers nitrogen, phosphorus and potassium was 18.46, 23.38 and 5.20 kg/ha, respectively. The per hectare plant protection charges was observed very less in case of all region and state because of farmer purpose in that crop was subsistence crop and crop rotations. The results in respect of productivity all seven variables viz., human labour, bullock power, machine power, manure, nitrogen, phosphorus and potash included in the production function analysis have jointly explained 74 per cent of the total variation in the output of greengram, in that regression coefficient of human labour, bullock labour, manure and potash fertilizer at state level were positive and significant which indicated that these variables have major contribution on output. The resource use efficiency in greengram production in Maharashtra state was observed that, the ratios of MVP to MC was positive and more than unity for human labour, manures, nitrogen and potash indicating less use, which could help to increase production up to maximum level by their optimum utilization. Hence need to train the farmer regarding use of different inputs in a manner to optimize yield.*

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

Introduction

India is the largest producer and consumer of pulses in the world. Major pulses grown in India are Chickpea, Pigeonpea, Greengram, Blackgram and Lentil. Among various pulse crops, For the triennium ending 2012-13, the total area under pulses was 23.90 million hectare. India's population would reach 1.68 billion by 2030 from the present level of 1.21 billion. Accordingly, the projected pulse requirement for the year 2030 is 32 million tons with an anticipated required growth rate of 4.2% (IIPR Vision 2030). India has to produce not only enough pulses but also remain competitive to protect the indigenous pulse production. In view of this, India has to develop and adopt more efficient crop production technologies along with favourable

policies to encourage farmers to bring more area under pulses. In which the greengram are the major ones.

In Maharashtra state, greengram is cultivated in 6.71 lakh hectare with production 3.71 lakh tonnes. Its productivity is 552.91 kg/ha. The reasons for low productivity are low inputs usage. In greengram production process, some of the resources either are underutilization or overutilization. There is need to know optimum resource use for maximum profit in greengram production. Keeping in view the above aspects, the present study has been undertaken. To study the resource use structure, productivity and efficiency of greengram in Maharashtra.

Material & Methods

The study is based on the secondary data collected from the 138 farm families under the Scheme for Creating Permanent Machinery Studying the Cost of Cultivation of Principal Crops in Maharashtra. The data pertained to the agricultural year 2013-2014, The sample recorded from Western Maharashtra (73), Marathwada (35) and Vidarbha (30) for further analysis. The samples are not available for greengram in Konkan regions of Maharashtra, 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

Cobb Douglas production function was used for estimating factors influencing the productivity of pulses.

$$Y = aX_1^{b_1}X_2^{b_2}X_3^{b_3}X_4^{b_4}X_5^{b_5}X_6^{b_6}X_7^{b_7}e^u$$

Where,

Y = Output of main produce (q ha-1)

a = Intercept.

X1= Human labour (man days ha-1)

X2= Bullock power (pairs days ha-1)

X3 = Machine power (hr ha-1)

X4= Manure (q ha-1)

X5= Nitrogen (kg ha-1)

X6= Phosphorus (kg ha-1)

X7 = Potassium (kg ha-1)

u = Error term

bi's = Regression coefficients of respective variables

Estimation of marginal value product

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

$$\text{Marginal value product(MVP) of } X_i = b_i \frac{\bar{Y}}{\bar{X}} P_y$$

Where,

bi = Elasticity of production of ith input

Y = Geometric mean of output

\bar{X}_i = Geometric mean of i^{th} input

P_y = Per unit price of output (Rs.)

Results and Discussion

Per hectare resource use structure for greengram

The information on utilization of different resource for greengram is presented in Table 1 on per hectare basis.

Result indicated that at state level, the per hectare use of human labour bullock labour, and machine power utilization level was 52.45 man days, comprising 17.81 male and 34.54 female labour days, 4.88 pair days and 3.64 hr. It is concluded from above fact that irrespective of region, use of labour was more or less same on region and state level of greengram grower. The per hectare utilization of machine power was observed more (i.e. 4.15 hr) in case of Vidarbha region as compare to other region i.e Marathwada (3.62 hr) and Western Maharashtra (3.23).

On an average at state level, the per hectare utilization of seed was 14.33 kg. The per hectare utilization of seed was observed more or less same irrespective of region. The use of manures at state level, was 3.82 q/ha. The per hectare manure utilization by Western Maharashtra, Marathwada and Vidarbha region of greengram grower were 3.16, 8.27 and 2.61 quintals respectively, It is less than the recommended dose 50 q/ha. due to the non-availability and high cost of manures. At the state level, per hectare use of chemical fertilizers nitrogen, phosphorus and potassium was 18.46, 23.38 and 5.20 kg/ha, respectively. The plant protection charges incurred were 179.63 per ha for greengram. The per hectare plant protection charges was observed very less in case of all region and state because of farmer purpose in that crop was subsistence crop and crop rotations.

Resource use productivities in production of greengram

Cobb-Douglas production function were used for estimating resource use productivities in greengram production on the basis of goodness of fit (R²) which indicates the proportion of total variation

of the dependent variable jointly explained by the independent variables.

The results of resource use productivities for greengram production in different region of Maharashtra are presented in the Table 2. The results revealed that, the seven resource variables viz; human labour (X_1), bullock labour (X_2), machine power (X_3), manure (X_4), nitrogen (X_5), phosphorus (X_6) and potash (X_7) were included in the production function analysis of greengram.

The analysis showed that, these variables have jointly explained about 78 per cent variation in the yield of greengram in Western Maharashtra. The regression coefficients of human labour (X_1), manures (X_4), phosphorus (X_6) and potash (X_7) were turned out to be positive and significant indicating thereby that, one unit increase in the use of these variables would increase the yield by 0.4857, 0.2411, 0.0983 and 0.0583 per cent, respectively. However, bullock labour, machine power and nitrogen were not significant but positive, it indicate that they have positive impact on output.

In Marathwada the value of coefficient of multiple determination (R^2) was 0.73 which indicated that, 73 per cent variation in greengram production was explained due to variation in all independent variables. Therefore, it can be concludes that, each explanatory variable on its own was very important but together they explained significantly part of variation in greengram production. Further, regression coefficients with respect to human labour (X_1), manure (X_4), nitrogen (X_5) and potash (X_7) were 0.3882, 0.2349, 0.3496 and 0.2996 which were positive and significant at 5 per cent level and indicated that, when we increase the use of these variables by 5 per cent over their geometric mean, would lead to increase greengram production by 0.3882, 0.2349, 0.3496 and 0.2996 per cent respectively, while regression coefficients with respect to bullock power (X_2) and phosphorus (X_6) were 0.0363 and 0.0257 which were positive but not significant indicated that, it indicate that they have positive impact on output.

The estimated parameters of human labour (X_1), manure (X_4), nitrogen (X_5) and potash (X_7) were significant in Vidarbha, it indicating that for every one per cent increase in the expenditure on these resources would result in increased gross return by 0.4269, 0.2461, 0.2802 and 0.0394 per cent respectively. The value of coefficient of multiple determination (R^2) was found to be 0.71 which indicate that 71 per cent variation in output was jointly explained by seven independent resource variables under consideration.

At the state level, coefficient of multiple determination (R^2) turned out to be to be 0.74 indicating that 74 per cent variation in output is jointly explained by the above considered independent factors. The regression coefficient of variables human labour (X_1), bullock labour (X_2), manure (X_4), nitrogen (X_5) and potash (X_7) were statistically significant. This indicated that, one per cent increase in the human labour (X_1), bullock labour (X_2), manure (X_4), nitrogen (X_5) and potash (X_7) would result into 0.3818, 0.0072, 0.2132, 0.3216 and 0.0716 per cent increase in the output respectively.

Resource use efficiency in greengram production

The resource use efficiency in greengram production on the sample farms in the different region and state was judged with the help of MVP/MC ratio and the results of resource use efficiency are presented in Table 3.

The resource use efficiency in greengram production in Western Maharashtra region was observed that, the ratios of MVP to MC was positive and more than unity for human labour, manures, phosphorus and potash, indicating that, these resources were used advantageously and there was greater chance to increase the use of these resource. When MVP to price ratio tends to unity at that point, there would be efficient utilization of resource. Whereas, it was less than one in case of bullock labour and nitrogen, indicating over utilization of these inputs in greengram cultivation.

In Marathwada region resource use efficiency in production of greengram is noticed that, marginal value product to factor cost ratio (MVP/MC) was greater than unity in case of human labour, manures, nitrogen and potash. This implied that, higher resource use efficiency was achieved in case of these variables. The MVP/MC ratio for bullock labour and phosphorus were found to be less than unity suggesting the inefficient use of these resources.

In Vidarbha region, revealed that (MVP/MC) was greater than unity in case of human labour, manure, nitrogen and potash. This means these variable were underutilized and there is scope for increasing inputs utilization whereas others are excessively used.

In case of state level farmer category the MVP/MC ratio is showing above 1 for human labour, manure, nitrogen and potash indicating less use, which could help to increase production up to maximum level by their optimum utilization. Hence needs to train the farmers regarding use of different inputs in a manner to optimize yield.

Conclusions

Result indicated that at state level, the per hectare use of human, bullock, machine power and seed utilization indicated that irrespective of region, use of these resources was more or less same on

region and state level of greengram grower. The per hectare manure utilization is less than the recommended dose 50 q/ha. due to the non-availability and high cost of manures. In case of resource use productivities in greengram cultivation for state level, it was observed that all seven variable viz., human labour, bullock power, machine power, manures, nitrogen, phosphorus and potash included in the production function analysis have jointly explained 74 per cent of the total variation in the output of greengram. At state level resource use efficiency in production of greengram is noticed that, marginal value product to factor cost ratio was greater than unity in case of human labour, manures, nitrogen and potash. 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.

Policy

1. The yield levels are likely to be significantly improved through expansion of nonfarm sectors, reform of farmer associations and participating in agriculture innovating programs.
2. Increasing minimum support prices (MSP) of greengram will act as an incentive for greengram growers to divert better land and resources for cultivation of greengram.

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.
- 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.
- Joshi P.K and RakaSaxena. 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: 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.

Reddy, A. A. 2009: Pulses production Technology: status and way forward, *Economics and Political Weekly*, 44(52):73-80.

Table 1: Resource use structure for greengram in Maharashtra (Per ha.)

Sr. No	Resources	Unit	Region			Maharashtra
			Western Maharashtra	Marathwada	Vidarbha	
1	Total Human labour	Mandays	52.48	52.99	53.04	52.35
	a. Male		17.54	18.25	18.17	17.81
	b. Female		34.94	34.74	34.87	34.54
2	Bullock Power	Pairdays	5.70	5.31	3.65	4.88
3	Machine Power	hr	3.23	3.62	4.15	3.64
4	Seed	kg	14.97	14.34	13.52	14.33
5	Manures	q	3.16	8.27	2.61	3.82
6	Total Fertilizers	kg	35.65	73.70	49.08	47.04
	N		16.07	20.93	20.31	18.46
	P		13.67	45.16	25.57	23.38
	K		5.91	7.61	3.20	5.20
7	Plant protection charges	(₹)	36.12	00.00	440.83	179.63

Table 2: Result of Cobb-Douglas production function for greengram in Maharashtra

Sr. No	Particular	Region			Maharashtra
		Western Maharashtra	Marathwada	Vidarbha	
1	Intercept (a)	0.4149	0.2777	0.1839	0.3991
2	Human labour (days/ha) (X ₁)	0.4857*** (0.1139)	0.3882** (0.1429)	0.4269* (0.2172)	0.3818*** (0.1439)
3	Bullock power (Pair days/ha) (X ₂)	0.0721 (0.0579)	0.0363 (0.1236)	0.0262 (0.1260)	0.0072* (0.0043)
4	Machine power (hr/ha) (X ₃)	0.0126 (0.0308)	0.1661 (0.3217)	0.0091 (0.0119)	0.0012 (0.0028)
5	Manures (q/ha) (X ₄)	0.2411** (0.1028)	0.2349** (0.1123)	0.2461** (0.1123)	0.2132** (0.1024)
6	Nitrogen (kg/ha) (X ₅)	0.0129 (0.0614)	0.3496** (0.1347)	0.2802** (0.1132)	0.3216*** (0.1238)
7	Phosphorus (kg/ha) (X ₆)	0.0983*** (0.0260)	0.0257 (0.0267)	0.0147 (0.2109)	0.0168 (0.3588)
8	Potash (kg/ha) (X ₇)	0.0583** (0.0250)	0.2996** (0.1232)	0.0394*** (0.0122)	0.0716*** (0.0246)
10	R ²	0.78	0.73	0.71	0.74
11	Number of observation	73	35	30	138
12	Degree of freedom	65	27	22	130

(Figures in parentheses are standard errors of respective regression coefficient)

Note - *, **, and *** indicates significance at 10, 5 and 1 per cent level respectively

Table 3: Resource use efficiency in production of greengram in different region of Maharashtra

Sr. No	Particular	Units	GM X	GM Y	Py	bi's	MPP	MVP	MC	MVP/M C
I	Western Maharashtra									
1	Total human labour	Man Days	52.48	5.07	4918.85	0.4857	0.0469	230.81	183.42	1.2584
2	Total bullock labour	Pair Days	5.60	5.07	4918.85	0.0721	0.0653	321.19	650.00	0.4941
3	Manures	q	3.16	5.07	4918.85	0.2411	0.3868	1902.80	150.00	12.6853
4	N	kg	16.07	5.07	4918.85	0.0129	0.0041	20.06	29.44	0.6813
5	P	kg	13.67	5.07	4918.85	0.0983	0.0365	179.33	45.98	3.9002
6	K	kg	5.91	5.07	4918.85	0.0583	0.0499	245.69	20.29	12.1089
II	Marathwada									
1	Total human labour	Man Days	50.40	7.10	3802.40	0.3882	0.0547	207.94	184.45	1.1274
2	Total bullock labour	Pair Days	4.15	7.10	3802.40	0.0363	0.0620	235.87	450.00	0.5241
3	Manures	q	7.12	7.10	3802.40	0.2349	0.2342	890.50	150.00	5.9366
4	N	kg	18.13	7.10	3802.40	0.3496	0.1369	520.58	36.17	14.3927
5	P	kg	40.16	7.10	3802.40	0.0257	0.0045	17.28	37.63	0.4591
6	K	kg	6.20	7.10	3802.40	0.2996	0.3431	1304.51	19.60	66.5565
III	Vidarbha									
1	Total human labour	Man Days	51.14	6.50	4042.00	0.4269	0.0543	219.31	184.39	1.1868
2	Total bullock labour	Pair Days	2.80	6.50	4042.00	0.0262	0.0609	246.07	550.00	0.4474
3	Manures	q	2.60	6.50	4042.00	0.2461	0.6154	2487.31	150.00	16.5821
4	N	kg	19.31	6.50	4042.00	0.2802	0.0943	381.30	26.04	14.6430
5	P	kg	23.52	6.50	4042.00	0.0147	0.0041	16.44	41.53	0.3959
6	K	kg	3.20	6.50	4042.00	0.0394	0.0801	323.79	18.65	17.3615
IV	Maharashtra									
1	Total human labour	Man Days	49.30	6.41	4038.75	0.3818	0.0496	200.47	185.60	1.0801
2	Total bullock labour	Pair Days	4.12	6.41	4038.75	0.0072	0.0112	45.13	585.13	0.0771
3	Manures	q	3.70	6.41	4038.75	0.2132	0.3693	1491.42	149.91	9.9488
4	N	kg	18.46	6.41	4038.75	0.3216	0.1117	451.13	29.34	15.3760
5	P	kg	23.38	6.41	4038.75	0.0168	0.0046	18.58	41.47	0.4481
6	K	kg	5.20	6.41	4038.75	0.0716	0.0883	356.64	19.72	18.0052