



**Research Paper**

# Economics analysis of Gram in Amravati district

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**ABSTRACT :** In this study, an attempt has been made to study economic analysis of gram in Amravati district with view to study the Cost and returns, resource use efficiency. The study was based on primary data collected from the Amravati district. Per hectare input utilization for gram indicates that the large farmers were used higher inputs as compared to other farm size group of farmers. Per hectare total cost of cultivation of gram for the sample as whole was Rs. 44349.95 per hectare, gross return from gram at overall level was Rs.71241.85 The input-output relationship at overall size group was 1.60 at Cost 'C'. For the study resource use efficiency of gram, Cobb-Douglas production function was used. In the overall group resources seed, plant protection and human labour were significant.

**KEY WORDS :** Gram, Cost and returns, Resource use efficiency

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## INTRODUCTION :

Agriculture is the backbone of the Indian economy but, in real terms the farmers not get proper returns from his investment. The variation in the market prices of agriculture commodities has been one of the major factors affecting the levels of the Indian farmers. In India, gram ranks 5<sup>th</sup> among food grain crops, is the most important pulse crop. Chickpea production increased from 1980 to 1990 by about a million tons (at 1.8% annually); there was a 5.6 per cent increase in yield over the decade. Gram commonly known as 'chickpea' or 'Bengal gram' is the most important pulse crop of India alone has nearly 75 per cent of the world acreage and production of gram. Gram occupies about 9.19 m ha of area under pulses production of India. It is used for human consumption as well as feeding to animals. An agricultural sector being unstable in nature may substantially impede the economic growth of the country.

Gram is grown in tropical, sub-tropical and temperate regions. *Cicer arietinum* commonly known as gram is an important pulse crop in India and native to south west Asia. About 70 per cent of world production of gram comes from Asia. In India, gram is the major pulse crop and occupies around two-fifth of the total area under all the pulses. Gram is basically raised as a *Rabi* crop, particularly in those areas that receive rainfall less than 10 cm during the winter season. It is the most important pulse crop of India occupying an area of 9.19 million ha. With production of 59 lakh tons in year 2014-15. The major gram production areas are situated in Madhya Pradesh, Rajasthan, Uttar Pradesh, Haryana, Maharashtra and Punjab. Gram is cultivated over an area of 1196,000 ha, and 834,000 tones production and Productivity 697 kg/ha in 2014-15 In Maharashtra. Amravati district contributes 1164'00'ha area under gram production is 1166'00' m tonnes and productivity is 1002 kg/ha in 2013-14. Amravati district contributes 1265'00'

ha area under gram production is 1004'00' m tonnes and productivity is 794 kg/ha in 2014-15.

The specific objectives have been undertaken as follows:

- To estimate cost and returns of gram crop
- To study the recourse use efficiency of gram production.

## MATERIALS AND METHODS :

Amravati district was purposively selected for the present study. In Amravati district following Tahsils were purposively selected *i.e.* Daryapur and Morshi. The primary data on inputs used and yield obtained from gram were collected from selected farmers by survey method. In all 100 farmers were selected for the study. The data pertain to the year 2013-14. The selected farmers were stratified into three groups on the basis of size of holdings *viz.*, Small farmers with the size of holding upto 0.01 to 2.00 ha, medium farmers with 2.01 to 4.00 ha, and large farmers with the holding of 4.01 above ha.

### Economics of gram worked out by using standard cost concepts :

#### Cost 'A' :

It is the actual paid out cost incurred by the cultivator.

#### Cost 'B' :

Cost B = Cost A + Rental value of owned land (@ of 1/6 of the value of gross produce – land revenue) + interest on fixed capital @ of 10% per annum.

#### Cost 'C' :

Total of direct as well as indirect cost including value of family labour constituents Cost C. It is calculated by adding imputed value of family labour to Cost B.

Cost C = Cost B + imputed value of family labour.

### Gross and net return :

#### Gross return:

Return obtained from the sale of crop output *i.e.* main products and by product.

#### Net return:

Net return computed at different cost concepts *i.e.* Cost 'A', cost 'B' and Cost 'C' by deducting respective costs from the gross returns.

### Input output ratio :

The input-output relationship work out on the basis of standard cost concepts.

#### Input-output ratio at Cost 'A' :

$$\text{Input - output ratio} = \frac{\text{Gross income}}{\text{Cost 'A'}}$$

#### Input-output ratio at Cost 'B' :

$$\text{Input - output ratio} = \frac{\text{Gross income}}{\text{Cost 'B'}}$$

#### Input-output ratio at Cost 'C' :

$$\text{Input - output ratio} = \frac{\text{Gross income}}{\text{Cost 'C'}}$$

### Resource use efficiency of gram :

The resource use efficiency of gram was worked out by using linear as well as Cobb-Douglas production function.

$$\text{Linear } Y = a + b_1x_1 + b_2x_2 + \dots + b_nx_n$$

$$\text{Cobb-Douglas } Y = ax_1^{b_1}x_2^{b_2}x_3^{b_3} \dots x_n^{b_n} U$$

where,

Y = Yield q / ha.

a = Constant intercept which indicated the level of output when zero inputs are use  $b_1, b_2, \dots, b_n$

Regression co-efficient of the respective factors fitted as below:

$X_1$  = Human labour (Days/ha)

$X_2$  = Bullock pair (Days/ ha)

$X_3$  = Machinery charges (hrs/ha)

$X_4$  = Seeds (kg/ha)

$X_5$  = Fertilizers (kg/ha)

$X_6$  = Manure (cl/ha)

$X_7$  = Plant protection measures (Rs./ha)

$X_8$  = Area (ha)

## RESULTS AND DATA ANALYSIS :

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

### Economics of gram production of selected farmers according to different size of group :

The study revealed that per hectare use of human labour for gram sample as a whole was 47.92 *i.e.* 48

man days while total bullock labour was 5.63 days per hectare. At overall level, the use of fertilizer was observed to be 57.96 kg N, P, and K per hectare. The gram crop is naturally fix N fertilizers that's why not use more N in gram crop *i.e.* 23.35, 24.51, 26.05 and 24.35 are small, medium, large and overall selected farmers. As well as K is very low use in gram crop (Table 1).

Comparison of input use between different size groups indicated that per hectare use of human labour and fertilizer was highest in large size group and bullock labour was highest in large size group. The yield of gram is 17.98, 17.40, 18.20 and 17.86 in small, medium, large and overall selected gram growers. The yield of gram was highest *i.e.* 18.20 quintals per hectare in large size group of holding and lowest in medium size group *i.e.* (17.40 qtls/ha). The overall gram production is 17.86 *i.e.* near about 18 qtl/ha. The gram gives main produce and by produce, by-produce is use full for animal feed. Gram crop gives by -produce 8 to 9 qtl/ha.

#### Cost of cultivation of gram :

It could be seen from the Table 2 that the per hectare

total cost of cultivation of gram for the sample as a whole was Rs.44349.95 Among the different items of expenditure human labour accounted highest share of the total Cost *i.e.* (18.33%). The proportion of other item of expenditure were bullock labour (6.38%), seeds (15.58%), fertilizer (0.88%) and interest on working capital (3.36%) and Fixed capital (5.26%), respectively.

At overall level Cost 'A' and Cost 'B' per hectare was Rs. 27392.20 and Rs. 41407.58, respectively which was 61.76 per cent and 93.35 per cent of total Cost *i.e.* Cost 'C'.

#### Economics of production, cost and returns of gram:

It could be revealed from the Table 3 that the gross return from gram production for overall average size group was Rs.712441.85 per hectare. The gross return ranged between Rs.69118.48 in medium size group to Rs.72080.18 in small size group. The overall cost 'A', cost 'B' and cost 'C' were Rs.27392.20, Rs.41407.58 and Rs.44249.95, respectively. Profit at Cost 'A' for overall size group from gram cultivation was Rs.43849.99 and at Cost C it was Rs.26891.90

Table 1 : Per hectare input utilization of gram			(Units/ha)			
Sr. No	Input	Unit	Physical quantity			Overall
			Small	Medium	Large	
1.	Total human labour					
	Male	Days	17.58	19.99	19.93	18.84
	Female	Days	28.4	29.64	29.73	29.08
	Total		45.98	49.63	49.66	47.92
2.	Hired human labour					
	Male	Days	11.84	12.07	12.15	11.98
	Female	Days	18.75	18.19	18.87	18.62
3.	Bullock labour	Days	5.54	5.57	5.85	5.63
4.	Machine labour	Hrs	7.75	7.94	7.73	7.80
5.	Seeds	Kg	86.37	85.82	86.90	86.34
6.	Manure	Cl.	7.29	6.56	6.22	6.82
7.	Fertilizer					
	N	Kg	23.35	24.51	26.05	24.35
	P	Kg	28.34	27.58	28.84	28.36
	K	Kg	5.00	5.46	5.51	5.25
	Total		56.69	57.55	60.4	57.96
8.	Family labour					
	Male	Days	5.74	7.92	7.28	6.86
	Female	Days	9.65	11.45	10.86	10.46
9.	Yield					
	Main produce	Qtls.	17.98	17.40	18.20	17.86
	By-produce	Qtls.	8.89	8.06	8.76	8.62

**Input-output relationship of gram :**

The output-input ratios for overall size group at Cost 'A', Cost 'B' and Cost 'C' were 2.59, 1.71 and 1.60, respectively. The output-input ratio calculated at cost A

and cost C. Output-input ratio at cost 'A' was highest *i.e.* 2.62 in large size group followed by small 2.60 and medium 2.57 size group (Table 4).

Thus, the study concludes that the Gram is most

**Table 2 : Per hectare cost of cultivation of gram for selected farmer's different size group**

Sr. No.	Particulars	Group			(Rs./ha)
		Small	Medium	Large	Overall
1.	Hired human labour				
	Male	2368.79 (5.31)	2392.6 (5.48)	2430.54 (5.42)	2390.09 (5.39)
	Female	2812.5 (6.31)	2729.8 (6.25)	2831.55 (6.32)	2791.12 (6.30)
2.	Bullock labour	2826.68 (6.34)	2724.6 (6.24)	2929.44 (6.54)	2826.78 (6.38)
3.	Machine labour	2327.13 (5.22)	2382.4 (5.45)	2320.0 (5.18)	2343.83 (5.29)
4.	Seeds	6909.93 (15.51)	6841.6 (15.67)	6952.29 (15.52)	6901.4 (15.58)
5.	Plant protection	1836.70 (4.12)	1819.3 (4.16)	1788.31 (3.99)	1819.73 (4.11)
6.	Manure	5103.55 (11.45)	4593.5 (10.52)	4357.56 (9.73)	4774.22 (10.78)
7.	Fertilizer				
	N	120.04 (0.26)	131.09 (0.30)	146.82 (0.32)	129.82 (0.29)
	P	170.04 (0.38)	165.5 (0.37)	175.67 (0.39)	170.40 (0.38)
	K	90.03 (0.20)	98.31 (0.22)	99.20 (0.22)	95.84 (0.21)
8.	Repairing charges	249.32 (0.55)	292.34 (0.66)	302.25 (1.16)	274.59 (0.73)
9.	Irrigation charges	2238.3 (5.02)	1929.4 (4.41)	2042.35 (4.56)	2102.82 (4.74)
10.	Land revenue	191.76 (0.43)	184.70 (0.42)	194.39 (0.43)	190.44 (0.43)
11.	Depreciation	793.04 (1.78)	893.57 (2.04)	939.45 (2.09)	857.79 (1.93)
12.	Interest on working capital @ 6% per annum	1512.97 (3.39)	1456.86 (3.33)	1488.50 (3.32)	1491.14 (3.36)
	Cost 'A'	27714.08 (62.22)	26816.27 (61.42)	27430.76 (61.25)	27391.86 (61.76)
13.	Rental value of land = 1/6 <sup>th</sup> of gross produce-land revenue	11821.60 (26.54)	11335.04 (25.96)	11812.94 (26.30)	11683.19 (26.32)
14.	Interest on fixed capital	2403.92 (5.39)	2200.41 (5.04)	2346.25 (5.23)	2332.51 (5.26)
	Cost 'B'	41939.61 (94.16)	40351.73 (92.43)	41589.95 (92.88)	41407.58 (93.35)
15.	Imputed value of family labour				
	Male	1148.94 (2.57)	1584.95 (3.63)	1557.9 (3.47)	1373.26 (3.10)
	Female	1448.14 (3.25)	1717.56 (3.93)	1630.24 (3.64)	1569.1 (3.54)
	Cost 'C'	44536.69 (100.00)	43654.24 (100.00)	44778.09 (100.00)	44349.95 (100.00)

**Table 3 : Economics of production, cost and returns of gram**

Sr. No.	Particulars	Size group			(Rs./ha)
		Small	Medium	Large	Overall
1.	Yield (q)				
	Main produce	17.98	17.40	18.20	17.86
	By-produce	8.89	8.06	8.76	8.62
2.	Price				
	Main produce (Rs./q)	3840.80	3810.20	3790.00	3819.53
	By-produce	3022.6	2821.00	3066.00	2977.00
3.	Total gross returns	72080.18	69118.48	72044.00	71241.85
4.	Cost of production /q	2308.86	2346.73	2291.87	2316.51
5.	Cost 'A'	27714.8	26816.27	27430.76	27392.20
6.	Cost 'B'	41939.61	40351.73	41589.95	41407.58
7.	Cost 'C'	44536.69	43654.24	44778.09	44349.95
8.	Net return over				
	Cost 'A'	44366.10	42302.21	44613.24	43849.99
	Cost 'B'	30140.57	28766.75	30454.05	29834.27
	Cost 'C'	27543.49	25464.24	27265.91	26891.90

**Table 4 : Input-output relationship in gram**

Sr. No.	Particulars	Small	Medium	Large	Overall
1.	Cost 'A'	2.60	2.57	2.62	2.59
2.	Cost 'B'	1.71	1.71	1.73	1.71
3.	Cost 'C'	1.61	1.58	1.60	1.60

**Table 5 : Resource use efficiency in gram**

Particulars	Unit	Size group			Overall
		Small	Medium	Large	
Intercept		2.10 (0.5991)	2.24 (0.6460)	1.48 (0.8026)	1.94 (0.3475)
Human labour (X <sub>1</sub> )	Days	-0.56*** (0.1778)	-0.37* (0.2059)	-0.43 (0.2621)	-0.46*** (0.1102)
Bullock labour (X <sub>2</sub> )	Days	0.034 (0.0256)	0.051* (0.0286)	0.055 (0.0415)	0.041*** (0.0159)
Machine labour(X <sub>3</sub> )	Hr.	0.029 (0.0336)	0.035 (0.3874)	0.020 (0.0487)	0.027 (0.0208)
Seed (X <sub>4</sub> )	kg	-0.56*** (0.1291)	-0.53*** (0.1488)	-0.60*** (0.1975)	-0.54*** (0.0802)
Fertilizer (X <sub>5</sub> )	kg	0.007 (0.0541)	-0.012 (0.0619)	0.009 (0.0812)	0.005 (0.0335)
Manure (X <sub>6</sub> )	Cl	0.075 (0.0931)	-0.13 (0.1060)	0.029 (0.1785)	-0.09 (0.0573)
Plant Protection(X <sub>7</sub> )	Rs.	0.35** (0.1352)	0.21 (0.1453)	0.47** (0.1939)	0.34*** (0.0818)
Area (X <sub>8</sub> )	ha.	0.001 (0.0101)	0.009 (0.0115)	-0.033 (0.0347)	0.007 (0.00038)
R <sup>2</sup>		0.56 (0.0118)	0.65 (0.0101)	0.59 (0.0126)	0.56 (0.0107)

\*, \*\* and \*\*\* indicate significance of values at P=0.10, 0.05 and 0.01, respectively and Figures in parenthesis indicates the standard error

profitable crop in Amravati district.

### Production function analysis and resource use efficiency :

It is observed from the Table 5, that the explanatory variables included in the production process have explained almost the variation. In small size group, the regression co-efficient of human labour, seed is significant at 1 per cent level of significance. In small size group, the regression co-efficient of plant protection is significant at 5 per cent level of significance and left of them variable are non-significant in small size group. In medium size group human labour and bullock labour is significant at 10 per cent level and seed is significant at 1 per cent level as other variable are non-significant at medium size group. In large size seed is significant at 1 per cent level and plant protection is at 5 per cent level and remaining variable were non-significant. In the table negative value indicate the excesses use of those resources. It was not use full for the farmers and not increases the total gross returns.

R<sup>2</sup> is the measure of the goodness of fit of the model. R<sup>2</sup> calculated from the overall shows that 0.56 per cent. In the small, medium, large size R<sup>2</sup> calculated are 0.56, 0.65, and 0.59, respectively. At overall size human labour, bullock labour seed and plant protection are is significant 1 per cent and 5 per cent level and left of them variable

are non-significant is overall size group.

### Conclusion :

Per hectare use of human labour, bullock labour for sample as a whole worked out to 47.92 days and 5.63 days, respectively. At overall level seeds and manure were 86.34 kg and 6.82 C.L., respectively. The level of fertilizer used was observed to be 24.35 kg nitrogen, 28.36 kg phosphorus and 5.25 kg potassium, respectively. The per hectare total cost of cultivation of gram for the sample as whole was Rs. 4434.95. At overall level per hectare Cost A, Cost B and Cost C Rs.27392.20, Rs.41407.58 and Rs.44349.95, respectively. The per hectare gross return from gram at overall level was Rs.71241.85. Profit at Cost A, Cost B and Cost C for overall size group was Rs. 43849.99, Rs.29834.27 and Rs.26891.90, respectively. The output-input relationship determinates the relative efficiency of capital. At overall size group cost A, cost B and cost C were 2.59, 1.71 and 1.60, respectively. Resource use efficiency worked out with the help of Cobb-Douglas production function. In overall group the regression co-efficient of human labour, bullock labour, seed and plant production are significant and other variable shows non-significant result. Comparison of inputs used between different size groups indicated that per hectare use of human labour was highest in medium size group whereas bullock labour, seed highest in large size group

and manure was highest in small size group. The output-input ratios were greater than unity which indicates that the gram is profitable crop in Amravati district. The production function shows that at overall level, all variable explain 56 per cent variation out-put of gram production.

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