

## Economics Performance Assessment of Green gram Crop with Application of Different Fertilizer Treatments

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**Abstract**— Based on primary data as yield obtained from present research work and with the help of questionnaire through personal interview from farmers, cost benefit analysis on field experiment for Green gram crop was carried out. Experimental study area is one hectare with five treatments where T<sub>5</sub> was kept as control and four others treatment were T<sub>1</sub>-Vermicompost @ 6.25 t/h, T<sub>2</sub>-NADEP compost @ 6.25 t/ha, T<sub>3</sub>-pit compost @ 6.25 t/ha, and T<sub>4</sub>-chemical fertilizer (50:25:25- N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O kg/ha). Yield of Green gram was harvested after 90<sup>th</sup> day. The per hectare cost of cultivation of Green gram crop was Rs 1,39,813 which gives gross returns of Rs 1,94,243 with the application of vermicompost treatment (T<sub>1</sub>). The per hectare cost of cultivation of Green gram crop was Rs 1,16,823 which gives gross returns of Rs 1,75,553 with the application of NADEP compost treatment (T<sub>2</sub>). The per hectare cost of cultivation of Green gram crop was Rs 1,05,179 which gives gross returns of Rs 1,05,688 with the application of pit compost treatment (T<sub>3</sub>). The per hectare cost of cultivation of Green gram crop was Rs 89,919 which gives gross returns of Rs 1,37,060 with the application of chemical fertilizer treatment (T<sub>4</sub>). The per hectare cost of cultivation of Green gram crop was Rs 91,093 which gives gross returns of Rs 1,58,865 in control treatment (T<sub>5</sub>). The input output ratios were about in 1.38, 1.50, 1.00, 1.52 and 1.74 the treatment T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> respectively. The analysis of the data revealed that, the cost of cultivation of Green gram crop was more (Rs 1,39,813) with B/C ratio (1.38) with vermicompost treatment. Green gram crop was most profitable in control treatment followed by chemical fertilizer treatment.

**Keywords**— Cost, economics, Green gram, growth, profit, yield

### I. INTRODUCTION

The economic analysis based on the cost and returns from the crop production provide a synoptic view of the economics of production of any crop. To determine economic variation of the treatments the benefit to cost ratio was used. BCR is the ratio between present value of benefit and present value of cost. The use of chemicals in agriculture practices causes harm to the environment but organic farming protects the environment from the effect of pollution. Many researchers reported that in an organically managed field activity of earth worm is higher than the inorganic fertilizer use in agriculture [1]. Economic analysis of farming system helps them and the concerned development facilitators in making the proper decisions which are required for further improvement. Economic analysis is found as the major aspect of measurement of farming efficiency [2]. Study of economics of crop production helps in determination in the successful and sustainable production of agriculture [3]. The present investigation aimed to find out the most cost-effective of production of Green gram crop using different recommended

rates of organic and chemical fertilizer and identify the most profitable fertilizer treatment.

### II. METHODOLOGY

In current investigation, based on primary data as yield obtained from present research work and with the help of questionnaire through personal interview from farmers, cost benefit analysis on field experiment for Green gram crop was carried out. The field experiment was conducted with five treatments via T<sub>1</sub> (vermicompost prepared from agricultural solid waste and cow dung), T<sub>2</sub> (NADEP compost prepared from agricultural solid waste and cow dung), T<sub>3</sub> (pit compost prepared from municipal solid waste), and T<sub>4</sub> (chemical fertilizer) and T<sub>5</sub> (control). Experimental study area is one hectare with five treatments where T<sub>5</sub> was kept as control and four others treatment were T<sub>1</sub>-Vermicompost @ 6.25 t/h [4], T<sub>2</sub>-NADEP compost @ 6.25 t/ha [4], T<sub>3</sub>-pit compost @ 6.25 t/ha [4], and T<sub>4</sub>-chemical fertilizer (50:25:25- N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O kg/ha); [5]. Yield of Green gram was harvested after 90<sup>th</sup> day. As this was organic fertilized based field experiment, no any additional measures for plant protections were used in all

experimental plots. As per the recommendations of the expert committee of Government of India, the items of cost of cultivation cover both the paid out costs and the imputed costs. The paid cost includes hired labour cost (human + animal + machineries), maintenance expenses on owned animals and machinery, expenses on material inputs, depreciation on agricultural implements, machineries and farm building, cost against land revenue, miscellaneous expenditures, interest on working capitals. The imputed costs consists of value of family labour, rent of owned land and interest on owned fixed capitals for which the farmer does not incur any cash expense [6]. Economic parameters were calculated by various formulae's [7, 8, 9, 10 and 11].

Depreciation value = (Present value assets - Junk value assets) / Remaining life of assets

Junk value = 10 % from present value of assets

Per hectore depreciation cost = Total depreciation / cropped area

**Cost of cultivation** = **Cost A** +  $\rightarrow$  subsequent **Cost B** +  $\rightarrow$  subsequent **Cost C**

Rental value of land = 1/6 of gross produce - Land revenue cess and taxes

Profit (Rs) = Gross return - Total cost of cultivation

BC ratio = Gross return / Total cost of cultivation

The main objective is to evaluate cost of cultivation in Green gram crop with application of organic and chemical fertilizers treatments in comparison with control.

### III. RESULTS AND DISCUSSION

The major objective of this study is to find the benefit cost ratio, unit cost of production of Green Gram crop grown with the application of vermicompost, NADEP compost, pit compost, chemical fertilizer treatments.

The present research aimed to analyze the cost and return of Green gram vegetable using organic and chemical fertilizer treatments. Experimental study area is one hectore with five treatments where T<sub>5</sub> was kept as control and four others treatment were T<sub>1</sub>-Vermicompost @ 6.25 t/h, T<sub>2</sub>-NADEP compost @ 6.25 t/ha, T<sub>3</sub>-pit compost @ 6.25 t/ha, chemical fertilizer (50:25:25- N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O kg/ha). Yield of Green gram was harvested after 90<sup>th</sup> day [12]. Number of labours, quantity of seeds, machinery charges, irrigation charges, land revenue and taxes, depreciation cost, interest on fixed capital were utilized same in all the treatments. Cost of vermicompost, NADEP and pit compost Rs. 6,000/ton, Rs. 3,000/ton and Rs. 3,000/ton were used in concern treatments. Required cost of assets and materials for the cultivation of Green crop were shown in Table 1.

Working capital also named as variable cost include cost of various assets including hired male labour (No. 12 = Rs. 3,600), hired female labour (No. 55 = Rs 8,250), family female labours (No. 2 = Rs. 300), family male labours (No. 2 = Rs. 600), machinery charges Rs 10,000, seed (7.5 kg/ha = Rs 2,000), irrigation charges Rs 1500 for 3 month, land

revenue cess and taxes Rs 110/year for irrigated. Other miscellaneous expenses were presented in Table 2. The highest cost (Rs 37,500) came out to be for purchasing of vermicompost fertilizer followed by Rs 18,750 on purchase of NADEP and pit compost, Rs 2,321 on purchase of chemical fertilizer per hectore.

Working capital were expense Rs 70,460 in treatment T<sub>1</sub>, Rs 51,710 in treatment T<sub>2</sub>, Rs 51,710 in the treatment T<sub>3</sub>, Rs 32,381 in treatment T<sub>4</sub> and Rs 30,060 in treatment T<sub>5</sub> for cultivation of Green gram crop. Fix capitals include cost of various assets including farm house (No. 1 = Rs. 1,00,000), drip unit (No. 1 = Rs. 1,00,000), electric motor 3HP (No. 1 = Rs. 10,000), weeding hook (No. 2 = Rs 280), sickle (No. 1 = 140), spade (No. 2 = Rs. 500), kudali (No. 1 = Rs. 300) and Ghameli ( No. 4) = 880. Total depreciation value Rs 11,840 was spending same for cultivation of Green gram crop in all the treatment. Total Rs. 2,01,210 was capitalized for investment for cultivation of Green gram crop.

The economics of production of Green gram crop were estimated and shown in Table No. 02. The average yield per hectare of Green gram were obtained 4,365 kg, 3,945 kg, 2,375 kg, 3,080 kg and 3,570 kg in the treatment T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> respectively. Average market price Rs 44.5/kg was taken for calculation of economics to the all fertilizer treatments. Green gram had earned per hectore gross returns of Rs 1,94,243 in treatment T<sub>1</sub>, Rs 1,75,553 in treatment T<sub>2</sub>, Rs 1,05,688 in treatment T<sub>3</sub>, Rs 1,37,060 in treatment T<sub>4</sub> and Rs in Rs 1,58,865 in treatment T<sub>5</sub>. The cost of cultivation per hectore for of Green gram crop have been estimated to Rs 1,39,813 in treatment T<sub>1</sub>, Rs 1,16,823 in treatment T<sub>2</sub>, Rs 1,05,179 in treatment T<sub>3</sub>, Rs 89,919 in treatment T<sub>4</sub> and Rs 91,093 in treatment T<sub>5</sub>. The profit comes out to be Rs 54,430 in treatment T<sub>1</sub>, Rs 58,730 in treatment T<sub>2</sub>, Rs 509 in treatment T<sub>3</sub>, Rs 47,141 in treatment T<sub>4</sub> and Rs 67,772 in the treatment T<sub>5</sub>. Gross return Rs was higher than cost of cultivation therefore profit obtained in all the treatments were positive.

The input output ratios were about 1.38, 1.50, 1.00, 1.52 and 1.74 in the treatment T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> respectively. Green gram crop cultivated with application of pit compost treatment (T<sub>3</sub>) produce less benefit with C/B ratio 1.00. Control treatment (T<sub>4</sub>) was an encouraging maximum return as compared to remaining fertilizer treatments from three months.

**Table 1: Expenditure items for cultivation of Green gram production [13 and 14]**

Sr. No.	Items	Expenditure (Rs)
1	Hired male labour	Rs 300 for 8 hours per day
2	Hired female labour	Rs 150 for 8 hours per day
3	Sowing through Bullock pair	Rs. 4500/- per hectore
4	Machinery charges (ploughing, clod crushing, harrowing and levelling)	Rs. 10,000/- per hectore
5	Vermicompost	Rs. 6/- per kg
6	NADEP compost	Rs. 3/- per kg
7	Pit compost	Rs. 3/- per kg
8	Urea	Rs. 5.96/- per kg
9	Single super phosphate (SSP)	Rs. 7.6/- per kg
10	Murate of potash (MOP)	Rs. 11.3/- per kg
11	Drip irrigation set	Rs. 1,00,000/- per hectore
12	Electric motor (3 HP)	Rs. 10,000/-
13	Electrical charges	Rs. 1500 for three months (For 3 HP E. Motor)
14	Insecticides/Fungicides	Not used
15	Repairs to implements and machinery	Not repaired
16	Land revenue cess and taxes	Rs. 110/- per hectore for irrigated land.
17	Travelling cost for organic fertilizers	Rs. 500/- per tonne
18	Farm house/farm building	Rs. 1,00,000/-
19	Sprayer (for one NAG)	Rs. 1500/-
20	Weeding hook for (one NAG)	Rs. 140/-
21	Sickle (for one NAG)	Rs. 140/-
22	Spade (for one NAG)	Rs. 250/-
23	Kudali (for one NAG)	Rs. 300/-
24	Pickaxe (for one NAG)	Rs. 500/-
25	Axe (for one NAG)	Rs. 300/-
26	Ghameli (For one NAG)	Rs. 220/-
27	Iron bar (For one NAG)	Rs. 500/-
28	Junk value	10% from present value of assets
29	Interest on working capitals	6% for seasonal crop
30	Interest on fixed capitals	10% per year

**Table 2. Economics analysis of Green gram production after 90<sup>th</sup> days**

Sr. No	Treatments →	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>
	Economics Particulars ↓	Expenditure (Rs)				
1	Hired human labours (Male)	3,600	3,600	3,600	3,600	3,600
	Hired human labours (Female)	8,250	8,250	8,250	8,250	8,250
2	Bullock labour	4,500	4,500	4,500	4,500	4,500
3	Machinery charges	10,000	10,000	10,000	10,000	10,000
4	Seed (7.5 kg)	2,000	2,000	2,000	2,000	2,000
5	Fertilizers	37,500	18,750	18,750	2,321	0
6	Irrigation Charges	1,500	1,500	1,500	1,500	1,500
7	Plant protection	0	0	0	0	0
8	Repairs to implement and machinery	0	0	0	0	0

9	Land revenue cess and taxes	110	110	110	110	110
10	Expenses on acquisition of inputs and miscellaneous	3,000	3,000	3,000	100	100
	<b>Working capital (1 to 10)</b>	70,460	51,710	51,710	32,381	30,060
11	Depreciation on farm implements, machinery and buildings	11,840	11,840	11,840	11,840	11,840
12	Interest on working capital	4,228	3,103	3,103	1,943	1,804
	<b>Cost A (Working capital + 11 + 12)</b>	86,528	66,653	66,653	46,164	43,704
13	Rental value of land	32,264	29,149	17,505	22,734	26,368
14	Interest on fixed capital (Fixed cost Rs. 201210/- )	20,121	20,121	20,121	20,121	20,121
	<b>Cost B (Cost A+13+14)</b>	1,38,913	1,15,923	1,04,279	89,019	90,193
15	Family labours Male/Female)	900	900	900	900	900
	<b>Cost C (Cost B + 15)</b>	1,39,813	1,16,823	1,05,179	89,919	91,093
16	Yield kg per ha.	4,365	3,945	2,375	3,080	3,570
17	Selling price (Rs per kg)	44.5	44.5	44.5	44.5	44.5
18	Gross return	1,94,243	1,75,553	1,05,688	1,37,060	1,58,865
19	Total income	54,430	58,730	509	47,141	67,772
20	BC ratio	1.38	1.50	1.00	1.52	1.74

T<sub>1</sub> indicates vermicompost, T<sub>2</sub> indicates NADEP compost, T<sub>3</sub> indicates pit compost, T<sub>4</sub> indicates chemical fertilizers, and T<sub>5</sub> indicates control. Fraction rounded off to complete figures.

#### IV. CONCLUSION

The analysis of the data revealed that, the cost of cultivation of Green gram crop was more with application of vermicompost treatment followed by other fertilizer treatments. Green gram crop was profitable in control treatment than chemical fertilizer treatment.

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