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Economic analysis of beet production in Maharashtra

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Abstract
India is an agricultural country where 65 per cent population is dependent on agriculture. Vegetables have many important functions in peoples' everyday life. Being nutritional benefit and of short duration, vegetable crops allow enough scope for increasing the intensity of cropping. Of the various salad vegetables grown, carrot, radish and beet are the important salad vegetables.

The present paper entitled "Economic Analysis of Production of beet in Maharashtra" was undertaken with the specific objectives viz; i. To estimate cost and return structure in beet cultivation ii. To estimate resource use productivity and resource use efficiency in beet production and iii. To examine the constraints in beet production

Data for the present study were collected from two tahasils of Pune district viz., Ambegaon and junner. These tahasils were selected according to maximum area under beet. In all six villages, three villages from each tahasil were selected randomly and from six villages 90 beet farmers were selected. Beet farmers were selected on the basis of area under beet i.e. 0.01 to 0.20 ha first group, 0.21 to 0.40 second group and 0.41 ha and above third group.

Per hectare cost of cultivation of beet for first, second and third group was Rs. 152607, Rs. 130428.20, Rs 104786, respectively. The cost of cultivation decreases with increase in size of beet area. The share of hired human labour at overall level was Rs.13856.68 which accounted to 11.48 per cent of cost 'C'. The share of manures and plant protection was Rs.16833.88 Rs. 6875.90 which accounts to 13.95 per cent and 5.70 per cent, respectively. Seed alone shares 14.12 per cent to the cost 'C'.

Per hectare yield was worked out to 168.89 quintals, 174.38 quintals and 141.46 qtls in first, second and third group respectively. At overall level it was 155.83 quintals. The per quintal cost of cultivation at overall level was Rs. 774.12.

B: C ratio in first, second and third groups were worked out to 1.12, 1.29 and 1.26, at cost C. The B: C ratio at overall level at cost 'C' was worked out to 1.24.

The per hectare use of human labour days was 209. 15 man days for first group 162.13 days for second group and 129.69 days for third group. Among the size class of farms, hired human labour was decreases with the increase in size groups.

The per hectare use of bullock labour was 4.41 pair days at overall level. The bullock labour requirement was higher on small first group farm i.e. 1.27 pair days followed by 0.42 pair days on second group of farm and it was not used on third group farm. In the contrary, the machine labours were used at highest (10.42 hrs) in third group.

In case of the resource use productivities in beet root cultivation for different size group of farms, it was observed that all seven variables *viz.,* total human labour (X_1), bullock labour (X_2), manures (X_3), nitrogen (X_4), phosphorus (X_5), potash (X_6) and plant protection charges (X_7), included in the production function analysis have jointly explained 85 per cent of the total variation in the output of beet root. At the overall manures, phosphorus, potash and plant protection were significant for which the output was responsive.

The constraints faced by farmers in production was high cost of seed, high wages of labour, high cost of pesticides and fertilizers and shortage of labour in peak period. In these constraints high cost of seeds and shortage of labour were most serious problems.

Keywords: Economic, beet production, agricultural

Introduction

Beet root originated from *beta vulgaris* L. ssp. *Maritima* by hybridization with B. *patula*. Crop has site of origin probably in Europe. Earlier types were with long roots like that of carrot. Beet root, sugar beet and palak belong to species B. *vulgaris* and cross compatible.

India is an agricultural country where 65 per cent population is dependent on agriculture. Vegetables have many important functions in peoples' everyday life. Being nutritional benefit and of short duration, vegetable crops allow enough scope for increasing the intensity of cropping. More than fifty kinds of vegetables from different groups such as solanaceous, cucrbitaceae, leguminaceae, cruciferous, tubers, bulbs-roots, leafy, salad vegetables, etc. are grown in tropical, sub-tropical and temperate regions of the country.

Of the various salad vegetables grown, carrot, radish and beet are the important salad vegetables.

Agriculture continues to be the mainstay of our economy as it occupies the central place in rural life. Horticultural sector is fast emerging and the most remunerative sector. Horticultural crops are characterized by high productivity, higher returns, and higher potential for employment generation and exports, comparatively lower requirement of water and easy adaptability to adverse soil and waste land situations. Vegetable cultivation is one of the important branch of horticulture. Indian Council of Medical Research (ICMR) has recommended the consumption of at least 308 grams of vegetables per day and as much variety as the season permits (Anonymous, 2001). On the contrary, the per capita consumption of vegetables in India is only 103 grams per day. This indicates the wide gap between the use and requirement of vegetables. Beet root crop is short duration crop and popular in Pune district of Maharashtra State. Keeping this view in mind the preset investigation has been outlined with following objectives.

Objectives

The scientific objectives of the study viz; Economic Analysis of Beet production in Maharashtra is as below.

1. To estimate cost and return structure in beet cultivation.
2. To estimate resource use productivity and resource use efficiency in beet production.
3. To examine the constraints in beet production

Methodology

The basic objective of the study is to investigate the economic aspect of production and constrain of beet root production. An attempt is made in this study to estimate the per hectare resource use and the cost of utilization of beet root by using standard cost concept used in farm management studies viz, cost 'A', cost 'B', & cost 'C' and net profit at various cost levels was worked out.

Selection of District

Pune District of Maharashtra state was selected on the basis of maximum area under beet.

Selection of tahsil

Two tahsil from Pune District viz, Ambegaon and junner was selected on the basis of maximum area under beet.

Selection of village

Three villages from each tahsil were selected on the basis of maximum area under beet cultivation. Thus, total 6 villages were selected for the study.

Selection of size groups

As the operational holding of the farmers in Pune District is very low and the beet vegetable crop is grown on small holdings, the sample cultivators was grouped into 3 groups on the basis of area under beet.

1st group: 0.01 to 0.20 ha
2nd group: 0.21 to 0.40 ha
3rd group: 0.41ha. and above

Selection of sample cultivators

The list of beet growers was obtained from the revenue record at village level. Five beet growers from each group growers from each village were selected randomly. Thus total 90 samples were selected from 6 villages. The 90 beet growers were classified as below

1st group: 0.01 to 0.20 ha: 30
2nd group: 0.21 to 0.40 ha: 30
3rd group: 0.41ha. & above: 30
Total: 90

Design of questionnaires

The specially designed questionnaires were prepared for collecting the data on production of beet.

Collection of data

Data was collected by survey method from the selected sample cultivators for the year 2018-19.

Analysis of data

The data was analyzed with simple statistic tools viz; Mean, average, percentage, Cobb Douglas production function, standard cost concept etc.

Functional analysis

The Cobb-Douglas type of production function was used for estimating the resource use productivities

The equation of production function is as below

$$\mathbf{Y = ax_1^{b1}x_2^{b2}\ x_3^{b3}\ldots.Xn^{bn}\ e^{u}}$$

Where,

Y = Output (qtls./ha)
X_1 = Total human labour (man days/ha)
X_2 = Machine labour (hrs/ha)
X_3 = Manuers (qtls/ha)
X_4 = Nitrgen (kg/ ha)
X_5 =Phosphorus(kg/ha)
X_6 =Potasium(kg/ha)
X_7 =plant protection (Rs/ha)
e^u = error term
a = Intercept b's= Regression coefficient

Estimation of Resource use efficiency

Marginal Value Product (MVP) of Xi = bi (Y/X) Py

Where,

bi = Elasticity of production of i^{th} input
Y = Geometric mean of output.
Xi = Geometric mean of i^{th} input.
Py = Per unit price of output

Results and Discussion

The beet root is popular root crop grown for its fleshy roots which are used as cooked vegetable, salad and for picking and canning. It is a short duration crop and grown in every season. The farmer can earn good income in short period if he received good prices for the beet root. Though the agronomic condition of pune district is quite favorable and there is tremendous potential for taking up commercial cultivation of this crop during all seasons, the standardization of recommended does has not been done so far under local agro-climatic conditions for its profitable cultivation.

In this section, an attempt has been made to study the cost of cultivation, resource use gap, gross income, net profits, and problems in production of beet root.

Cost of cultivation of Beet root

Cost of cultivation of beet root crop was calculated by using

standard cost concepts and same is presented in Table 1.

From Table 1 it was observed that at overall level per hectare total cost i.e. cost 'C' worked out to Rs.120631.40, while it was. Rs.152607.00, Rs.130428.20. and Rs. 104786.30 in case of first, second and third group respectively.

Among the item of costs, at the overall level, the expenditure on total human labour was highest (25.16 per cent) and was followed by seed (14.12 per cent) Manures (13.95 per cent), machine (9.50 per cent), plant protection (5.70 per cent) and fertilizer (5.06 per cent) respectively. The same trend was observed among the difference group of farmers.

Table 1: Cost of cultivation of beet root (Per ha)

Sr. No.	Items	Size groups							
		Group 1st		Group 2nd		Group 3rd		Overall	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value
1	Hired human labour Male labour (Man days)	3.84	1324.7 (0.87)	4.83	1764.04 (1.35)	5.03	1412.19 (1.35)	4.76	1498.7 (1.24)
	Female labour (Man days)	51.11	11009.26 (7.21)	64.38	12346.07 (9.47)	61.37	12808.54 (12.22)	58.95	12357.98 (10.24)
2	Bullock pair (Pair days)	2.31	1945.18 (1.27)	0.59	542.92 (0.42)	--	--	0.58	499.54 (0.41)
3	Machine (Hrs.)	18.15	11666.67 (7.64)	19.67	12343.82 (9.46)	19.39	10914.63 (10.42)	19.25	11461.24 (9.50)
4	Seed (kg)	5.83	20262.96 (13.28)	4.61	18573.03 (14.240	3.44	15128.05 (14.44)	4.2	17029.97 (14.12)
4	Manures (Qtls)	61.11	22296.30 (14.61)	47.19	17752.81 (13.61)	36.59	14536.59 (13.87)	43.97	16833.88(13.95)
5	Fertilizers (kg)								
	a. Nitrogen	141.2	8142.59 (5.34)	92.92	6165.17 (4.73)	69.51	5407.93 (5.16)	88.91	6108.47 (5.06)
	b. Phosphorus	83.51		64.27		47.20		58.53	
	c. Potassium	67.78		35.96		45.37		46.58	
6	Irrigation charges		647.70 (0.42)		597.2 (0.46)		513.59 (0.49)		561.42 (0.47)
8	Incidental charges		129.82 (0.09)		118.32 (0.09)		115.40 (0.11)		118.79 (0.10)
9	Plant protection charges (`)		10125.93 (6.64)		6523.60 (5.00)		5996.95 (5.72)		6875.90 (5.70)
10	Repairs		81.11 (0.05)		81.8 (0.06)		93.66 (0.09)		88.01 (0.07)
11	Working capital		87631.59 (57.42)		76808.78 (58.89)		66927.53 (63.87)		73433.89 (60.87)
12	Interest on working capital @6%		5257.9 (3.45)		4608.53 (3.53)		4015.65 (3.83)		4406.03 (3.65)
13	Depreciation on implements and machinery		436.95 (0.29)		476.01 (0.36)		453.11 (0.43)		457.12 (0.38)
14	Land revenue (`)		100.36 (0.07)		63.90 (0.05)		67.63 (0.06)		72.29 (0.06)
15	Cost A (`)		93.426.74 (61.22)		81957.22 (62.84)		71464.32 (68.20)		78369.33 (64.97)
16	Rental value (`)		28275.63 (18.53)		27886.66 (21.38)		21975.05 (20.97)		24797.09 (20.56)
17	Interest on fixed capital@10% (`)		908.01 (0.59)		999.20 (0.77)		970.53 (0.93)		967.95 (0.80)
19	Cost "B' (`)		122610.40 (80.34)		110843.10 (84.98)		94410.11 (90.10)		104134.40 (86.32)
20	Family labour								
	a Male (Man days)	83.61	18320.74 (12.01)	58.2	12770.56 (9.79)	35.85	7870.12 (7.51)	50.73	11128.99 (9.23)
	b Female (Man days)	67.87	11675.93 (7.65)	36.4	6814.71 (5.22)	14.54	2506.10 (2.39)	30.3	5368.08 (4.45)
21	Cost C (`)		152607 (100.00)		130428.2 (100.00)		104786.30 (100.00)		120631.40 (100.00)
22	Yield (qtls)	168.89	170255.60	174.38	167703.37	141.46	132256.10	155.83	149216.29
23	Per quintal cost (`)		903.59		747.94		740.73		774.12

(Figures in parentheses indicate the percentages to the Cost C)

The per quintal cost is declining over the different groups. It indicates the economies of scale The per hectare yield is also declining over the different group of farmers.

From above discussion it is concluded that the per quintal cost of beet root is increased as size of group (area under beet) increased. It indicates the economies of scale. The per hectare yield was maximum in first group and declined afterwards in second and third group of farmers. It clearly noted that, the small beet root farms were managed efficiently by the sample farmers than big farmers so that there is a variation in the yield among different groups.

Resource use gap in beet root

The per hectare input use up to the recommended level is useful for higher production of any crop. This differs usually from the actual use of inputs by the sample farmers. The per hectare resource use gap in beet root cultivation is presented in Table 2.

Table 2: Resource use gap in beet root cultivation (Per ha)

Resource		Group 1st	Group 2nd	Group 3rd	Overall
1. Seed	Recommended (kg)	5			
	Actual	5.83	4.61	3.44	4.20
	Gap	-0.83	0.39	1.56	0.80
	% gap	16.6	7.8	31.2	16
2. Manure	Recommended (q.)	125			
	Actual	61.11	47.19	36.59	43.97
	Gap	63.89	77.81	88.41	81.03
	% gap	51.11	62.25	70.73	64.82
3. N	Recommended (kg)	60			
	Actual	141.2	92.92	69.51	88.91
	Gap	-81.2	-32.92	-9.51	-28.91
	% gap	135.33	54.87	15.85	48.18
4. P	Recommended (kg)	75			
	Actual	83.51	64.27	47.2	58.53
	Gap	-8.51	10.73	27.8	16.47
	% gap	11.35	14.31	37.07	21.96
5.K	Recommended (kg)	100			
	Actual	67.78	35.96	45.37	46.58
	Gap	32.22	64.04	54.63	53.42
	% gap	32.22	64.04	54.63	53.42
6. Yield	Recommended (q.)	275			
	Actual	168.89	174.40	141.5	155.80
	Gap	106.11	100.6	133.5	119.2
	% gap	38.59	36.58	48.55	43.35

- Gap indicates excess use over recommendation
+ Gap indicates less use than recommendation

It is indicated from the Table 2. that, all the inputs were utilized less than the recommendation, except the seed in first group, nitrogen in all groups, and phosphorous in first group. At the overall level only nitrogen use was more than recommendation.

At the overall level, the gap between actual and recommended yield was 43.35 per cent. It was maximum in large size group of farmers (48.55 per cent) followed by first group (38.59 per cent) and second (36.58 per cent) size group of farmers.

From the foregoing discussion it was noted that there was a low and imbalance use of all the inputs across all the size groups. The low and imbalance use of inputs leads to the low productivity of beet than that of recommended level.

Economics of beet cultivation

The per hectare gross returns of beet in first, second and third size group was Rs.1,70,255.60, Rs. 1,67,703.37 and Rs. 1,32,256.10, respectively. At overall level, the per hectare gross return was found to be Rs. 1,49,216.29. The net returns obtained from beet at cost 'C' was Rs.17,648.60, Rs. 37,275.17 and Rs. 27469.80 per hectare from first, second and third groups respectively and at overall level it was Rs. 28,584.89 per hectare.

The benefit cost ratio indicates the return from each rupee investment in beet cultivation. The result revealed that the B: C ratio is highest in second group and it was 1.29, Similarly B:C ratio was 1.26 and 1.12 for third and first groups respectively. At overall level B:C ratio at cost 'C' was 1.24. It clearly indicates that, the beet cultivation is a profitable crop.

Table 3: Economics of beet root (Values in Rs.)

Sr. No.	Particulars	Size group			Overall
		Group 1st	Group 2nd	Group 3rd	
1	Per qtls cost	903.59	747.94	740.73	774.12
2	Main produce(qtls)	168.89	174.38	141.46	155.83
3	Value (kg)	170255.60	167703.37	132256.10	149216.29
4	Rate/ qtl	1008.09	961.60	934.67	957.74
5	Cost A	93426.74	81957.22	71464.32	78369.33
6	Cost B	122610.40	110843.10	94410.11	104134.40
7	Cost C	152607	130428.20	104786.30	120631.40
8	Profit at				
	Cost A	76828.86	85746.15	60791.78	70846.96
	Cost B	47645.2	56860.27	37845.99	45081.89
	Cost C	17648.6	37275.17	27469.8	28584.89
10	B:C ratio	1.12	1.29	1.26	1.24

Functional analysis

Production of beet root involved relationship between inputs and their outputs. It provides a tool by mean of which the problems of production can be analyzed.

The empirical evidences from previous studies suggest that amongst the many mathematical functions, Cobb-Douglas type of production function is the appropriate one for the study of resource productivity, because it specifies diminishing productivity and diminishing marginal rate of substitution among the factor and gives specific diminishing, increasing or constant returns. The data were therefore,

subjected to functional analysis by using the following formula of Cobb-Douglas production function

$Y = a X_1^{b1} X_2^{b2}$---------- $X^n b^n e^u$.

In this functional formula 'Y' is dependent variable, Xi's are independent resource variables, 'a' is constant representing intercept of the production function and bi's are the regression coefficient. In logarithmic terms, this function transforms into a linear form of the following type.

Log Y = log a + b_1 log X_1 + $b_2$log X_2 + -------- + bn log Xn + u log e.

For fitting the production function, seven inputs viz., total human labour, machine power, manure, nitrogen, phosphorus, potassium, and plant protection have been considered as important factors in the production of crop.
The output of the crop has been used as dependant variable. The equation fitted was at the following from

$Y = aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}X_7^{b7} e^u$

Where,
Y= Output of main produce (qtls/ha)
X_1= Total Human labour (man days/ha)
X_2= Machine power (hrs/ha)
X_3= Manures (Qtls/ha)
X_4= Nitrogen (kg/ha)
X_5= Phosphorus (kg/ha)
X_6= Potassium (kg/ha)
X_7= Plant protection charges (Rs./ha)
u= Error term
a= Intercept
bi's= Regression coefficient

1. First farmers groups
The value of coefficient of multiple determinations R^2 was found to be 0.88 per cent that means 88 per cent variation in output was jointly explained by the seven independent resource variables under consideration. The regression coefficient of variable, manures (X_3), potash (X_6) and plant protection(X_7) were positive and significant. It indicates that these variables where important variables where output was responsive.

2. Second farmers group
The estimated parameters of manures (X_3) phosphorus (X_5), potash (X_6) and plant protection(X_7) were significant, it indicating that for every one per cent increase in the use of these resources would results in increased yield by 0.10 per cent, 0.60 per cent, 0.09 per cent and 0.57 per cent respectively. The value of coefficient of multiple determinations (R^2) was found to be 0.76 per cent indicating that 76.00 per cent variation in output was jointly explained by the seven independent resources variables under consideration.

Table 4: Results of estimated Cobb-Douglas production function for different groups of beet cultivator

Sr. No.	Particulars	Units	Size group			Overall
			Group 1st	Group 2nd	Group 3rd	
1	Intercept		2.6660 (1.4804)	2.1323 (2.0957)	0.8588 (0.7226)	1.5056 (0.4480)
2	Total Human labour (X_1)	Days	0.1301 (0.4738)	-0.4949 (0.6424)	0.6860* (0.3494)	-0.0162 (0.1850)
3	Machine power (X_2)	Hrs	-0.1228 (0.0436)	-0.2099 (0.3707)	0.3643 (0.2950)	-0.0077 (0.0302)
4	Manures (X_3)	Qtls	0.0586* (0.0286)	0.1063* (0.0592)	0.1143*** (0.0419)	0.0755*** (0.0196)
5	N (X_4)	Kg	-0.07065 (0.2749)	-0.0208 (0.491)	-0.1778 (0.1265)	0.0984 (0.1389)
6	P (X_5)	Kg	-1.0820 (0.3428)	0.6074* (0.3292)	0.3557** (0.1361)	0.1730* (0.0936)
7	K (X_6)	Kg	0.7067* (0.3454)	0.0944* (0.0472)	0.2843** (0.1193)	0.0675* (0.0347)
9	Plant protection(X_7)	Rs.	0.4089** (0.1564)	0.5770* (0.2756)	0.0746 (0.0795)	0.2458*** (0.0825)
10	R^2		0.88	0.76	0.89	0.54

***, ** and * - Significant at 1 per cent,5 per cent and 10 per cent level respectively.
(Figures in the parenthesis are the standard errors of the respective regression coefficient)

3. Third farmers group
In case of third size group of farmers the value of coefficient of multiple determination (R^2) was found to be 0.89 per cent that means 89 per cent variation in output was jointly explained by the seven independent variables under consideration. Total Human labour (X_1), manures (X_3), potash (X_6) and phosphorus (X_5) were positive and significant. It indicates that there is a scope to increase these inputs for increasing the output.

4. Overall level
At the overall level, coefficient of multiple determinations (R^2) tuned out to be 0.54 indicating that 54 per cent variation in output is jointly explained by the above considered independent factors. The regression coefficient of manures (X_3), potash (X_6) and phosphorus (X_5) and plant protection(X_7) were turned out statistically significant.
This indicated that one per cent increased in these inputs the output would increases by 0.07 per cent, 0.17 per cent, 0.06 and 0.24 per cent, respectively. Other resources like Total human labor (X_1), machine power (X_2), and nitrogen (X_4) were non-significant.

Resources use efficiency
An efficiency of resources use in beet 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 5.
It is revealed from the Table 5. that, MVP to MC ratio was greater than unity for manures, Nitrogen, Phosphorus, potash and plant protection charges at the overall level. It indicates that these variables are efficient variables for increasing the output of beet. Similarly, manures, potash and plant protection charges in first group, manures, phosphorus, potash and plant protection charges in second group and total human labour, machine power, manures, phosphorus, potash and plant protection in third group were efficient variables. It indicates that there is a scope to increase these inputs for increasing the output.

Table 5: Resource use efficiency in beet production

Sr. No	Particulars	Units	GM (Xi)	GM of Y	Unit price Output (Py)	bi Value	MVP	MC	MVP/MC
Group 1st									
1	Total Human labour (X_1)	Days	205.59	162.52	1008.08	0.1301	103.65	224.45	0.46
2	Machine power (X_2)	Hrs	6.62	162.52	1008.08	-0.1228	-3040.00	643.15	-4.73
3	Manures (X_3)	Qtls.	18.97	162.52	1008.08	0.0586	506.07	364.85	1.39
4	N (X_4)	Kg.	133.64	162.52	1008.08	0.7065	-866.10	53.74	-24.75
5	P (X_5)	Kg.	79.06	162.52	1008.08	-1.0820	-2242.14	59.23	-49.83
6	K (X_6)	Kg.	62.23	162.52	1008.08	0.7067	1860.46	24.35	66.45
7	Plant protection(X_7)	Rs.	9234.89	162.52	1008.08	0.4089	7.25	1	7.25
Group 2nd									
1	Total Human labour (X_1)	Days	156.55	163.77	961.60	-0.4949	-497.86	203.87	-2.44
2	Machine power (X_2)	Hrs	18.13	163.77	961.60	-0.2099	-1824.06	627.54	-2.91
3	Manures (X_3)	Qtls.	14.28	163.77	961.60	0.1063	1172.80	376.2	3.12
4	N (X_4)	Kg.	92.34	163.77	961.60	-0.0208	-35.48	53.74	-1.01
5	P (X_5)	Kg.	58.83	163.77	961.60	0.6074	1625.85	59.23	36.13
6	K (X_6)	Kg.	19.61	163.77	961.60	0.0944	758.28	24.35	27.08
7	Plant protection(X_7)	Rs.	5195.04	163.77	961.60	0.5770	17.49	1	17.49

Sr. No	Particulars	Units	GM (Xi)	GM of Y	Unit price Output (Py)	bi Value	MVP	MC	MVP/MC
Group 3rd									
1	Total Human labour (X_1)	Days	129.59	138.48	934.67	0.6860	685.21	214.17	3.20
2	Machine power (X_2)	Hrs	17.67	138.48	934.67	0.3643	2668.35	562.9	4.74
3	Manures (X_3)	Qtls.	34.6	138.48	934.67	0.1143)	427.71	397.28	1.08
4	N (X_4)	Kg.	73.39	138.48	934.67	-0.1778	-313.61	53.74	-8.96
5	P (X_5)	Kg.	50.46	138.48	934.67	0.3557	912.45	59.23	20.28
6	K (X_6)	Kg.	40.23	138.48	934.67	0.2843	914.58	24.35	32.66
7	Plant protection(X_7)	Rs.	5881.53	138.48	934.67	0.0746	1.64	1	1.64
Overall									
1	Total Human labour (X_1)	Days	161.08	154.25	957.74	-0.0162	-14.88	217.5	-0.07
2	Machine power (X_2)	Hrs	12.74	154.25	957.74	-0.0077	-88.72	595.39	-0.15
3	Manures (X_3)	Qtls.	21.29	154.25	957.74	0.0755	523.97	382.84	1.37
4	N (X_4)	Kg.	96.86	154.25	957.74	0.0984	150.04	53.74	4.29
5	P (X_5)	Kg.	61.75	154.25	957.74	0.1730	413.96	59.23	9.20
6	K (X_6)	Kg.	37.18	154.25	957.74	0.0675	268.20	24.35	9.58
7	Plant protection(X_7)	Rs.	6596.39	154.25	957.74	0.2458	5.31	1	5.51

Problems in beet production

To know the problems faced by the cultivators in production of beet, the cultivator interviewed and the problems faced by them are depicted in Table 6.

From the above table, it is seen that high cost of seed was the major problem (88.89 per cent). About 83.33 per cent of farmers reported about shortage of labour, while 71.11 per cent of the farmer reported about high cost of fertilizers and pesticides. About 70.00 per cent of farmers reported about high wage rates for the hired human labour. Farmer faced problem of irregular electric supply to the extent of 66.67 per cent. The same trend was observed in three groups of farmers.

Tale 6: Problems in production of beet

Sr. No.	Particulars	Size groups			Overall (N=90)
		First (N=30)	Second (N=30)	Third (N=30)	
1	Shortage of labour	25 (83.33)	24 (80.00)	26 (86.67)	75 (83.33)
2	High wages for labour	20 (66.67)	19 (63.33)	24 (80.00)	63 (70.00)
3	High cost of fertilizers and pesticides	23 (76.67)	21 (70.00)	20 (66.67)	64 (71.11)
4	Seed	27 (90.00)	25 (83.33)	28 (93.33)	80 (88.89)
5	Irregular supply of electricity	20 (66.67)	18 (60.00)	22 (73.33)	60 (66.67)

(Figures in the parentheses are the percentages to number of respondents)

Conclusions

From present investigation following conclusions are drawn.

1. Per hectare total labour requirement for beet cultivation was 55.49. day's and 89.25 day's for male and female labour respectively.
2. Per hectare average yield of beet was 155.83 quintals. The per quintal cost decreases with increase in group of farms.
3. Per hectare overall cost of cultivation of beet was worked out to Rs. 120631.40 while overall benefit – cost ratio was worked out to 1.24.
4. The producer share in consumer rupee was 66.73 per cent.
5. High cost of seed under study and shortage of labour were the major constraints in production of beet.

Suggestions

The following suggestions emerged out on the basis of the conclusions of the present study.

1. The production function revealed that the estimates of manures, phosphorus, potash and plant protection charges

were significant indicated the scope for increasing the use level of these inputs at the overall level.
2. It is revealed from the present study, that the beet growers not applying recommended practices of inputs. They should follow recommended practices for obtaining recommended yield.
3. The cultivation of beet be popularized among the small and marginal farmers as they fetch good returns to the cultivators in short period and less capital investments.

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