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Assessment of Economic Efficiency of Off-Season Vegetables: Evidences from Himachal Pradesh

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Abstract: **An attempt has been made to examine the economic efficiency, cost and return analysis of major off-season vegetables in Himachal Pradesh. In the present study, major vegetables, namely pea, tomato, capsicum, cauliflower, French bean and cabbage was considered. The results revealed that the estimated per hectare cost of cultivation was highest in French bean/ green bean than that of other vegetable cultivation. Net returns per hectare in tomato cultivation was higher than that of other vegetables cultivation. The output-input ratio was found highest in case of tomato cultivation. In case of economic efficiency, study concluded that farmers were working in the first irrational zone of production function in case of pea, tomato, capsicum and cabbage i.e. increasing returns to scale. In case of cauliflower and French bean farmers were working in the third zone (irrational) of production function i.e. decreasing returns to scale. It indicates that vegetable growers do not make efficient use of their resources. The study also recommends optimum use of resources to achieve desire growth in vegetable cultivation. The vegetables cultivation has been influenced by number of factors like assess of irrigation facility, family labour, non-farm income of family and education level of cultivators was the main riving force for shifting towards vegetables cultivation.**

Index terms- cost of cultivation, economic efficiency, production function

I. INTRODUCTION:

India is blessed with various agro-climatic zones having distinct seasons. Various climatic conditions allow farmers to grow wide range of vegetables. Vegetables with shorter duration and higher productivity have resulted in greater economic return to farmers. India has witnessed huge increase in horticultural production over the last few years. Significant progress has been made in area expansion resulting in higher production. Total foreign export of all vegetables during 2017-18 from India was 7,35,198.19 MT and its value was Rs. 1,84,878 Lacs(APEDA, 2017-18).Vegetables cultivation gives higher employment opportunities for the farmers as well as agricultural labourers. If some information such as cost of cultivation, cost of production, Input output ratio, and marketing cost is available to the farmers, then the production of vegetable crops can be encouraged in the region for benefit of the farmers.

The total area under vegetable cultivation in the state is 88.37 thousand hectares with a total production of 1805.377 thousand metric tonnes in the year 2018-19 (NHB, 2018-19). The vegetable crops have been well advocated in solving the problem of food security. They are rich source of minerals, vitamins, fiber and contain a fair amount of protein as well as carbohydrates. Peas occupy a position of considerable importance because of its being vegetable and pulse crop. Peas is highly nutritious and contains in high percentage of protein, carbohydrates and vitamins. Tomato is one the most popular and important vegetable not only in India but also over the world. Tomatoes are used for soup, salad, pickles, ketchup, puree, sauces and in many other ways, besides consumption in fresh form. Capsicum is commonly known as Shimla mirch, and is called bell pepper in English, it is a crop of summer season in Himachal Pradesh and is consumed in green form. Cauliflower is used as vegetable in curries, soups and for pickles, cauliflower is rich in vitamin A and ascorbic acid. However, it is poor in protein and carbohydrates. French beans are one of the most important legume

pod vegetable grown in Himachal Pradesh. It is a main source of protein, calcium and iron. It is one of most popular winter vegetables in India. Cabbage is used as salad, boiled vegetable, cooked in curries, pickle as well as a dehydrated vegetable. Cabbage is rich in mineral matters and in vitamin A, B_1, B_2 and C.

The cultivation of vegetable is confronted with number of problems due to unpredictive weather and climatic conditions, inadequate and unprotective supply of irrigation, fertilizers, fertilizer doses, supply of PPM (plant protection measures), knowledge about training etc. in their production and commercialization (Chakraborty *et al.*, 2009). Keeping all these points in mind the present study was conducted to estimate the cost and returns of major vegetables, to analyse the resource use efficiency of vegetable farms and to identify the major problems faced by vegetable growers

II. MATERIALS AND METHODS

Solan district was selected purposively for the present study as it as higher proportionate share under the selected vegetables (pea, tomato, capsicum, cauliflower, French bean and cauliflower) in the state. For the present empirical investigation district Solan of Himachal Pradesh was selected purposively due to the reason that maximum vegetable crops are grown in the district. There are five development blocks in this district viz. Dharampur, Kandaghat, Nalagarh, Kunihar and Solan. At the first stage all the five development blocks were arranged in an ascending order on the basis of their respective size of population and two blocks were selected purposively because of maximum cultivation of vegetable crops. At the second stage all the panchayats in the two selected blocks were arranged in an ascending order on the basis of their respective population and three panchayats were selected randomly from each selected blocks. At the third stage, all the villages in each of selected six panchayats were arranged in an ascending order on the basis of their respective population and three villages from each of the selected panchayats were selected randomly. At the fourth stage, a list of all households in each of selected village was prepared and all the households were arranged in an ascending order on the basis of their respective size of holdings.

2.1 Analytical tools and framework:

2.1.1 Cost concepts: Farm management cost concepts were used

Cost A_1 includes:

i) Value of hired human labour (permanent and casual)
ii) Value of hired and owned bullock labour
iii) Value of hired and owned machine labour
iv) Value of manure (owned and purchased)
v) Value of Fertilizer (N+ P+K)
vi) Glue of seed (farm produced and purchased)
vii) Value of insecticides and pesticides
viii) Irrigation charges
ix) Staking/support material
x) Interest on working capital
xi) Depreciation of implements and farm buildings
xii) Land revenue, cs and other taxes
xiii) Miscellaneous expenses (payment to artisan etc.)

Cost A_2 = Cost A_1 + rent paid for leased-in-land

Cost B = imputed rental value or owned land (less land revenue paid thereupon)+ interest on owned fixed capital (excluding land)

Cost C= Cost B + imputed value of family labour

Cost D = Cost C managerial cost (10% of cost A_1) + risk margins (10% of cost A_1 for tomato and 5% of cost A_1 for other selected vegetables)

Cost D can also be grouped into operational cost as under:

Operational Cost or Variable cost: Value of family labour + Value of hired human labour + Value of hired and owned bullock labour + Value of hired and owned machine labour + Value of seeds (farm produced and purchased) + Value of manure + Value of fertilizer + Value of insecticides and pesticides + Irrigation charges + Staking/support material + Interest on working capital + Miscellaneous expenses (artisan etc.)

Fixed Cost: Land Revenue + Depreciation + Rental Value of Owned land + interest on fixed capital

Total cost of Cultivation = Variable cost + Fixed Cost + Managerial cost = Cost D

2.1.2 Farm income measures:

a) Gross farm income= yield × average price
   Average Price = value of utilized produced price + total value of sold produce (excluding marketing cost)
b) Net Farm Income = Gross farm Income – Cost D
c) Farm Business Income = Gross farm income- Cost A_1
d) Owned farm business income= Gross farm Income- Cost A_2
e) Family Labour Income= Gross Farm Income- Cost B
f) Farm Investment Income= Net farm income + interest on owned Fixed Capital + Rental value of owned land (excluding rent paid- on owned land)
g) Output Input Ratio:
   i) On the basis of total cost of cultivation = Gross farm income/Cost D
   ii) On the basis of paid out cost= Gross farm income/Cost A_1

2.2 Functional analysis:

The Cobb-Douglas production function was estimated for studying the relationship between output and the various input variables for the estimation of resource use efficiency.

The following types of equations were used:

$$Y = aX_1^{b_1}X_2^{b_2}X_3^{b_3} \ldots X_n^{b_n}e_u$$

The above function is linearized double log form as below:

$$\log Y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4$$

Y = Yield from i' th crop per hectare

a = Constant term

b_1— b_n = are production elasticity for X_1 to X_n

X_1—X_n are explanatory variables (i.e. seed human labour, bullock/machine labour. farmyard manure. fertilizers. plant protection chemicals etc.)

III. RESULTS AND DISCUSSION

3.1 Farm specific characteristics of vegetables growers:

The size and structure of the family, workforce and literacy status among the sampled farmers are the important factors which influencing the vegetable production. The socio-economic characteristics of sampled household in the study area have been presented in Table 1.

Table 1: Farm specific characteristics of sampled households

Particulars	Value
Number of the Family	200.00
Average size of Family	5.30
Male (%)	51.89
Female (%)	48.11
Sex ratio	927.00
Literacy rate (%)	89.92
Service & Business (%)	6.05
Rural Artisan (%)	18.07
Agriculture (%)	70.24
Wage labour (%)	5.64
Dependency Ratio w.r.t. family size	0.30
Average area under vegetables	0.68
Total cultivated area (ha)	1.00
Total land holding (ha)	1.51
Cropping intensity (%)	152.32

The perusal of table shows that total number of families has been found to be 200. The average size of family was 5.30 members per family out of which 51.89 per cent members per family were male and 48.11 per cent member per family female in the sampled households and number of females per thousand of males were found to be 927. The literacy rate of the study area was 89.92 per cent. It is noted that agriculture has the main occupation 70.24 per cent of work force practice farming. On an average 6.05 per cent workers population were engaged in public/private service and business. Rural artisans were found to be 18.07 per cent. On an average 5.64 per cent were wage labourers. Dependency ratio with respect to family size was 0.30. Dependency ratio indicates that on an average one worker has to support less than one member in the family in the sampled area. Average size of land holding per sampled respondents was found to be 1.51 hectare, out of which 66.23 per cent hectare was cultivated area. The cropping intensity of the study area was 153.32 per cent. Similar results were present by Sharma & Guleria 2015, Kudumala et al. 2017 and Singh et al. 2020 in their study on socio-economic characteristics of horticulture growers of Himachal Pradesh.

Table 2: Cost of Cultivation of major vegetables on the sample farms

(Rupees / hectare)

S. No.	Particulars	Peas	Tomato	Capsicum	Cauliflower	French beans	Cabbage
A.	**Variable cost**						
1	**Human Labour**	23535 (20.10)	24528 (11.43)	27259 (22.54)	22265 (20.26)	52555 (15.79)	31745 (19.82)
	i) Family	13766 (11.76)	13975 (6.51)	14160 (11.71)	13695 (12.46)	20448 (6.14)	16165 (10.09)
	ii) Hired	9769 (8.34)	10553 (4.92)	13099 (10.83)	8570 (7.80)	32107 (9.64)	20038 (12.51)
2	**Bullock/Machine Labour (Hired and Owned)**	4035 (3.45)	5036 (2.35)	9512 (7.86)	8345 (7.60)	26495 (7.96)	18977 (11.85)
3	**Seed**	6565 (5.61)	8276 (3.86)	11199 (9.26)	7064 (6.43)	30562 (9.18)	9708 (6.06)
4	**Manure (F.Y.M)**	7836 (6.69)	7772 (3.62)	8142 (6.73)	8813 (8.02)	47616 (14.30)	11524 (7.19)
5	**Fertilizers (N+P+K)**	16469 (14.06)	14017 (6.53)	7070 (5.85)	7079 (6.44)	52528 (15.78)	15401 (9.62)
6	**Plant Protection**	7661 (6.54)	22127 (10.31)	4401 (3.64)	4245 (3.86)	32224 (9.68)	5726 (3.57)
7	**Staking Material**	1313 (1.12)	4146 (1.93)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
8	**Irrigation Charges**	1026 (0.88)	2616 (1.22)	3776 (3.12)	4423 (4.03)	3881 (1.17)	3881 (2.42)
9	**Interest on Working Capital**	2460 (2.10)	3354 (1.56)	3211 (2.65)	2184 (1.99)	20287 (6.09)	7673 (4.79)
	Total Variable Cost (A)	**70900** (60.55)	**91872** (42.80)	**74571** (61.65)	**64418** (58.63)	**266149** (79.94)	**109092** (68.11)
B.	**Fixed cost**						
1	**Depreciation**	2963 (2.53)	1605 (0.75)	2913 (2.41)	2943 (2.68)	3293 (0.99)	3293 (2.06)
2	**Land Revenue**	51 (0.04)	50 (0.02)	51 (0.04)	51 (0.05)	50 (0.02)	50 (0.03)
3	**Interest on fixed Capital**	1497 (1.28)	892 (0.42)	1471 (1.22)	1487 (1.35)	1647 (0.49)	1647 (1.03)
4	**Imputed value of rental value of owned land**	31039 (26.51)	100741 (46.93)	30950 (25.59)	30983 (28.20)	31531 (9.47)	31531 (19.69)
	Total Fixed Cost (B)	35550 (30.36)	103288 (48.11)	35385 (29.26)	35464 (32.28)	36521 (10.97)	36521 (22.80)
	Sub-total (A+B)	106450 (90.91)	195160 (90.91)	109956 (90.91)	99882 (90.91)	302670 (90.91)	145613 (90.91)
C. Management cost (10% of subtotal)		10645 (9.09)	19516 (9.09)	10996 (9.09)	9988 (9.09)	30267 (9.09)	14561 (9.09)
Total cost (A+B+C)		117095 (100.0)0	214676 (100.0)0	120952 (100.0)0	109870 (100.0)0	332937 (100.0)0	160174 (100.0)0

Figure in parentheses are percentages to the total cost

3.2 Cost of cultivation:

Cost of cultivation is an important factor affecting agricultural income. In the present study, cost of cultivation of major vegetables, namely pea, tomato, capsicum, cauliflower, french beans and cabbage was estimated in Table 2.

It is observed that estimated per hectare cost of cultivation Rs. 332937 is highest in french bean/ green bean followed by tomato (Rs. 214676), cabbage (Rs. 160174), capsicum (Rs. 120952), cauliflower (Rs. 109870), and pea (Rs. 117095). Share of human labour cost in total cost was highest in capsicum i.e. 22.54 per cent followed by cauliflower (20.26 %), peas (20.10 %), cabbage (19.82 %), French beans (15.79 %) and tomato (11.43 %). The share of bullock labour was found maximum in cabbage (11.85 %) while minimum in tomato (2.23 %). Seed cost per hectare is highest in French bean (Rs. 30562.00) followed by capsicum (Rs. 11199.00), cabbage (Rs. 9708.00), tomato (Rs. 8272.54) cauliflower (Rs. 7064.00) and pea (Rs. 6565.00). Side by side fertilizer cost per hectare in French bean cultivation (Rs. 52528.00) is highest followed by peas (Rs. 16469.00), cabbage (Rs. 15401.00), tomato (Rs. 14016), cauliflower (Rs. 7079.00) and capsicum (Rs. 7070.00). Plant protection cost per hectare in French bean cultivation (Rs. 32224.00) is higher than that of other vegetables cultivation. Staking material is use mainly in tomato (Rs. 2615.50) and pea cultivation (Rs. 1313.00). Irrigation charges per hectare in cauliflower cultivation (Rs. 4423.00) is highest followed by French bean (Rs. 3881.00), cabbage (Rs. 3881.00), capsicum (Rs. 3776), tomato (Rs. 2615) and pea (Rs. 1026). Rental value of owned land per hectare in tomato cultivation (Rs. 100740.76) followed by French beans (Rs. 31531.00), cabbage (Rs. 31531.00), cauliflower (Rs. 30983.00), capsicum (Rs. 30950.00) and peas (Rs. 31039.00).

3.3 Cost concepts and Income measures

Cost concepts of vegetable production if sampled household is discussed in the table 3. The results revealed that the highest Cost A1 was found in the French beans i.e. Rs. 250691 followed by Cabbage and tomato. The value of Cost A1 and Cost A2 was found equal in all vegetable because no farmer was found in the study area who cultivates the lease-in land. The highest Cost B was found in French beans i.e. Rs. 282222 followed by tomato and cabbage and similar trend was observed other cost concepts.

The perusal of table 4 reveals that the gross return per hectare in French beans (Rs. 502000) is highest followed by tomato (Rs. 383904), cabbage (Rs. 238350), cauliflower (Rs. 225766), capsicum (Rs. 209474) and pea (Rs. 170540). The net farm income per hectare is highest in tomato (Rs. 169228), French beans (Rs. 169063), cauliflower (Rs. 125896), capsicum (Rs. 88523), cabbage (Rs. 78176) and pea (Rs. 53445). Farm business income is highest in tomato (Rs. 303461) and lowest in pea (Rs. 108895). Family labour income in French beans (Rs. 199330) is higher and lowest in pea (Rs. 64090). Output-Input ratio is highest in tomato (at total cost of cultivation = 1.79 & Paid out cost = 4.77) followed by capsicum, cauliflower, beans, cabbage and pea.

Table 3: Cost concepts of off season vegetable of sampled households

S.No.	Particulars	**Pea**	**Tomato**	**Capsicum**	**Cauliflower**	**French beans**	**Cabbage**
1	Cost A1	61645	80443	64845	55204	250691	97917
2	Cost A1=Cost A2	61645	80443	64845	55204	250691	97917
3	Cost B	92684	181184	95795	86187	282222	129448
4	Cost C	106450	195160	109955	99882	302670	145613
5	Cost D	117095	214676	120952	109870	332937	160174

Table 4: Returns from cultivation of off season vegetables

Sr. No.	Efficiency Measures	Pea	Tomato	Capsicum	Cauliflower	French beans	Cabbage
1	Gross Farm Income	170540	383904	209474	235766	502000	238350
2	Net Farm Income	53445	169228	88523	125896	169063	78176
3	Farm Business Income	108895	303461	144629	180562	251309	140433
4	Owned Farm Business Income	108895	303461	144629	180562	251309	140433
5	Family Labour Income	64090	188744	99519	135884	199330	92737
6	Farm Investment Income	95129	289485	130469	180556	230861	124268
7	Output/Input Ratio Over						
i)	Total Cost of Cultivation = Cost D	1.46	1.79	1.73	1.55	1.51	1.49
ii)	Paid out Cost = Cost A_1	2.77	4.77	3.23	4.15	2.00	2.43

3.4 Production Function

Various production models were used to analysis of resource use efficiency but Cobb-Douglas production model was the best fit because of high R^2 value than other model (Singh 2017 and Chand et al., 2017). This production model was used to determine the resource use efficiency in cultivation of pea, tomato, capsicum, cauliflower, French bean and cabbage with significance level presented in the Table 5.

In case of pea, the sum of the elasticities was greater than unity i.e. ($\sum$ bi = 1.457) which meant that farmers were working in the first irrational zone of production function i.e. increasing returns to scale (Similar findings were shown by the Zore*et al.* 2019). Human labour, FYM and fertilizers were found statistically significant at 1 per cent level. It implies that when 1 per cent increase in human labour. FYM and fertilizers it would lead to increase pea production of 0.195, 0.038 and 1.169 per cent respectively.

In case of tomato, the sum of significant regression coefficients was more than one i.e. ($\sum$ bi = 1.20) which indicates increasing returns to scale under tomato cultivation. Bullock/ machine labour, plant protection chemicals and seeds were statistically significant at 1 and 5 per cent level. It means if we increase plant protection chemicals and seeds by 1 per cent, then output will lead to increase 0.22, 0.24 and 0.313 per cent respectively.

In case of capsicum, the sum of elasticities was greater than unity i.e. ($\sum$ bi =1.059) which means increasing returns to scale under this crop. Human labour and fertilizers found statistically significant at 1 per cent level. It indicates if we increase fertilizers with human labour the output will increase by 0.90 and 0.45 per cent respectively.

In case of cauliflower, the sum of elasticities was less than one i.e. ($\sum$ bi = 0.824) which means decreasing returns to scale under cauliflower cultivation. Human labour, bullock/ machine labour and plant protection chemicals found statistically significant at 1 per cent level. By increasing human labour, bullock/machine labour by 1 per cent it would to lead to decrease output by 0.714 and 0.462 per cent. If we increase plant protection chemicals by 1 per cent, then the output would lead to decrease by 0.015 per cent.

Table 5: Elasticity coefficient of Cobb-Douglus production function

Farm Category	Regression coefficient									
	Intercept	Human labour (X_1)	Bullock/ machine labour (X_2)	F.Y.M (X_3)	Fertilizer (N+P+K) (X_4)	Plant protection chemical (X_5)	Seed (X_6)	∑bi	F	R2
Pea	-0.811* (0.077)	0.195* (0.065)	-0.076 NS (0.057)	0.038* (0.042)	1.169* (0.057)	0.099 NS (0.053)	0.032 NS (0.045)	1.457*	213.4	0.927
Tomato	-0.136 NS (0.202)	0.119 NS (0.153)	0.222* (0.089)	0.154 NS (0.198)	0.27 NS (0.188)	0.236** (0.109)	0.313** (0.112)	1.20*	34.05	0.66
Capsicum	-0.343 NS (0.188)	0.902* (0.191)	0.179 NS (0.153)	-0.125 NS (0.123)	0.451* (0.14)	-0.051 NS (0.13)	0.046 NS (0.124)	1.059*	41.5	0.799
Cauliflower	0.251 NS (0.191)	0.714* (0.226)	0.462* (0.158)	-0.262 NS (0.187)	0.108 NS (0.198)	-0.422* (0.105)	0.223 NS (0.148)	0.824*	11.84	0.482
French bean	-0.128 NS (0.091)	-1.194* (0.164)	0.981* (0.08)	0.807* (0.181)	-0.143 NS (0.098)	-0.015 NS (0.051)	0.524* (0.073)	0.83*	204.8	0.96
Cabbage	0.123 NS (0.141)	0.126** (0.055)	0.08 NS (0.151)	0.107 NS (0.124)	0.267* (0.099)	0.505* (0.171)	0.063*** (0.038)	1.15*	488.7	0.99

In case of French bean, the sum of significant regression coefficients was found less than one i.e. (∑ bi = 0.83) which means decreasing returns to scale under French bean cultivation. Human labour, bullock/ machine labour, FYM and seed found statistically significant 1 per cent level. If we increase the use of bullock/ machine labour with seeds, the output will rise by 0.98 and 0.52 per cent.

In case of cabbage, the sum of significant regression coefficients was more than unity i.e. (∑ bi = 1.15) which meant that farmers were working on first irrational zone of production function i.e. increasing to scale. There is a need to increase our inputs to reach in rational zone. Human labour, fertilizer, plant protection chemicals and seeds were found statistically significant at 1, 5 and 10 per cent level. It implies that when 1 per cent increase in human labour, fertilizer, plant protection chemicals and seeds it would lead to increase cabbage production of 0.126, 0.267, 0.505 and 0.063 per cent respectively.

Table 6. Problems faced by the sample vegetable growers

(Multiple response %)

Sr. No.	Particulars	Crops					
		Tomato	Peas	Capsicum	Cauliflower	Bean	Cabbage
1	**Quality of land**						
i)	Quality of soil is poor	21.94	17.33	14.52	16.30	17.31	20.00
ii)	Farm size is very small	93.55	92.67	90.32	85.19	86.54	80.00
iii)	Lack of water management	35.48	32.00	28.23	29.63	28.85	30.00
2	**Labour**						
i)	Skilled labour not available in time	98.71	96.67	96.77	92.59	86.54	90.00
ii)	High wage rate(of hired labour)	91.61	92.00	90.32	89.63	88.46	87.50
3	**Seed (HYV)**						
i)	HYVs seeds in not good	23.23	21.33	22.58	22.22	28.85	22.50
ii)	Quality of seeds in not good	16.13	14.67	17.74	14.81	15.38	17.50
iii)	Very high prices	96.77	96.67	96.77	94.81	86.54	92.50
4	**Irrigation**						
i)	Lack of permanent sources of irrigation	48.39	88.00	55.65	53.33	76.92	72.50
ii)	Irrigation facilities not available	32.26	34.67	24.19	38.52	23.08	27.50
5	**Fertilizers**						
i)	Fertilizers not available in time	9.68	20.67	12.10	14.81	19.23	22.50
ii)	Desired brand not available	46.45	29.33	39.52	25.93	21.15	20.00
iii)	High prices	51.61	54.67	56.45	59.26	67.31	55.00
6	**Plant Production Chemicals**						
i)	Lack of knowledge about use of chemicals	46.45	45.33	41.94	48.15	40.38	37.50
ii)	Desired brand not available	45.16	44.00	40.32	46.67	38.46	35.00
iii)	Don't know the proper dose & time	24.52	24.00	30.65	25.19	21.15	20.00
iv)	High Prices	94.19	93.33	91.13	92.59	94.23	87.50

3.5 Problems Faced by the Sample Vegetables Growers:

Vegetables play an important role in economic and social spheres for enhancing income and nutritional status of the people in developing countries. The demand for vegetables is continuously increasing at a fast rate. Since vegetable crops are more sensitive to climatic conditions and require more irrigation water and inputs as compared to other crops, they need special attention during the production process. The multiple responses of the sample vegetable growers regarding different production problems are highlighted in Table 6.

From the Table, it is observed that on an average about 85 percent to 94 percent of the growers reported that farm size is very small for the cultivation of selected vegetables in the study area. On an average 98.71 per cent tomato farmers reported the problem of non-availability of skilled labour at a proper time, followed by the capsicum, peas, cauliflower, cabbage and bean in the present study. high wage rate (92.65 %) as another main problem for the cultivation of peas followed by tomato capsicum, cauliflower, bean and cabbage producing farmers in the study area.

On an average 96.77 per cent of capsicum and tomato producing farmers would felt that seed prices were very high followed by peas, cauliflower, cabbage and bean producing farmers.Non-availability of HYVs seeds at proper time was also reported as a problem by 28.85 percent of the bean producing farmers followed by tomato, capsicum, cabbage and cauliflower producing farmers in the study area. Poor quality of seed was also realized by the respective vegetable producing farmers, highest 17.74 percent in the case of capsicum followed by cabbage, tomato, bean and cauliflower producing farmers. However, in case of capsicum, cauliflower and tomato producing farmer reported 55.65 percent, 53.33 percent and 48.39 percent respectively. About 38.52 percent in case of cauliflower and 34.67 percent in case of peas producing farmers could not get irrigation facilities to their farms.

High prices were the biggest concern for these farmers for all the selected vegetables. Again, in case of plant protection material (chemicals) majority of the sample farmers felt that the price of plant protection chemical was very high. They also felt that many of them do not have adequate knowledge of the type of chemicals to be used appropriate doses for different diseases and pest as well as of the method of use of these chemicals.

VI Conclusion

Cost of cultivation in vegetables is higher than food grains cultivation. We have considered here cost of production of major vegetables, namely pea, tomato, capsicum, cauliflower, French bean and cabbage. Total input cost has been calculated on the basis of local village market prices.It is observed that estimated per hectare cost of cultivation is highest in French bean/ green bean followed by tomato, cabbage, cauliflower, capsicum and pea. Net returns per hectare in tomato cultivation was higher than that of other vegetables cultivation. The output-input ratio was found highest in case of tomato cultivation. Study concluded that farmers were working in the first irrational zone of production function in case of pea, tomato, capsicum and cabbage i.e. increasing returns to scale. It means increase in all inputs leads to a more than proportional increase in the output. There is a need to increase the use of several inputs to reach in rational zone. In case of cauliflower and French bean farmers were working in the third zone (irrational) of production function i.e. decreasing returns to scale. This occurs when an increase in all inputs leads to a less than proportional increase in output. Therefore, there is a need of reduction in the inputs applications. Government should subsidize the inputs like fertilizers and plant protection chemicals. A comprehensive agricultural policy will be helpful for the promotion of vegetables and prices stability.

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