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Profitability of Vegetables in Hill Agriculture: An Economic Analysis

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A B S T R A C T

Though India has emerged as a major producer of horticultural crops and the share of horticulture in the economy has been increasing, there is still a lot of scope in harnessing the potential of this sector. Sectors like horticulture (both fruit and vegetable cultivation) have a comparative advantage in the hilly region due to its agro-climatic conditions. The study was conducted in Dhari block of Nainital district, Uttarakhand. Both primary and secondary data was collected for the study purpose. Four vegetables covering maximum area under vegetable cultivation was selected. On this basis, pea, cabbage, French bean and tomato are selected for the study. The costs in and returns from each vegetable crop is analysed and found that the returns per rupee invested from pea, cabbage, tomato, bean were 1.56, 1.25, 1.20 and 1.10 respectively. Thus, it is profitable for vegetable growers to adopt cultivation in the region.

Introduction

India is endowed with a remarkably heterogeneous area characterized by a great diversity of agro climatic zones, allowing for production of a variety of horticultural crops such as fruits, vegetables, flowers, spices, plantation crops, root and tuber crops, and medicinal and aromatic crops. Horticulture exports have helped the country to earn Rs 14,000 crore in 2011-12. Horticulture accounts for 30% of India's agricultural GDP from 8.5% of the cropped area (Economic Survey, 2015-16).

Though India has emerged as a major producer of horticultural crops and the share of horticulture in the economy has been increasing, there is still a lot of scope in harnessing the potential of this sector. Fruits and vegetables account for nearly 90% of the total horticulture production in the country. India is now the second largest producer of fruits and vegetables in the world and is the leader in several horticultural crops, namely mango, banana, papaya, cashew nut, areca nut, potato, and okra (Horticultural Statistics at a Glance, 2015).

Uttarakhand is primarily a mountainous state with only about ten percent of its total geographical area in the plains. Further, with

more than three-fourth (78 percent) of its total population dependent on agriculture for livelihood. Agriculture is an important sector in state's economy and contributes 15.5% in Gross State Domestic Product. The yield from the field crops is not very high in the hilly areas of the state. This is largely due to the mountainous terrain that makes it impossible to adopt mechanized modern agriculture in these areas. Thus, these crops are produced in the hills mostly to fulfill the subsistence needs of the farmers. Sectors like horticulture (both fruit and vegetable cultivation) have a comparative advantage in the region due to its agro-climatic conditions.

The various constraints faced by the vegetable growers are their poor resource base and the resources at the disposal of the farmers are allocated in accordance of the importance and suitability of enterprises on the farms. Productivity of vegetable crops is unable to reach its optimum level. Low productivity may be attributed to poor infrastructure, poor irrigation, small and fragmented land holdings, and low investment capacity of the farmers, fragile ecosystem and inaccessibility to technology. The perishable nature of the vegetables also results in inability on the part of producers to manage supply in assembling markets.

The current paper examines the cost in and returns from the four major producing vegetables in Uttarakhand.

Materials and Methods

The study was conducted in Dhari block of Nainital district. Both primary and secondary data was collected for the study purpose. Selection of vegetables: Four vegetables covering maximum area under vegetable cultivation was selected. On this basis, pea, cabbage, French bean and tomato are selected for the study. Around 60 farmers was selected from the 4 villages with the restriction that 15 farmers represent each vegetable. To estimate costs in and returns from vegetable production total costs and returns were calculated using CACP cost concepts.

Returns from the vegetables were estimated by calculating gross returns and net returns.

$GR_j = MPj \times MPP_j$

$NRj^* = GRj - COPj^*$

Where,

GR_j = Gross returns from j^{th} vegetable crop (Rs/ha)

MP_j = Main products of j^{th} vegetable crop (Qt/ha)

MPP_j = Price of main product of j^{th} vegetable crop (Rs/Qt)

NRj^* = Net returns from j^{th} vegetable crop (Rs/ha)

$COPj^*$ = Cost of production of j^{th} vegetable crop (Rs/ha)

j = Vegetable crop to be selected.

(*denotes net returns over different cost concept i.e. $CostA_1$, $CostB_1$…… $CostC_3$)

Results and Discussion

The profitability of a crop depends on the level of costs and returns. The right use of inputs is necessary to maximize the level of output in any production enterprise. Hence, study of costs and returns in various crop enterprises exercises an important role in determining the relative profitability of various crop enterprises. Tables 1 to 2 reveal the costs and returns in the cultivation of pea, cabbage, tomato and bean.

Costs and returns in pea cultivation (Rs/ha)

Costs of production of pea are detailed in table 1. The total cost of production i.e., cost C3 was Rs. 72060.39 per ha. It is evident

from table that the cost A1, i.e., the direct cost involved in pea production, was Rs. 29154.90 per ha. The operational cost (Rs. 23004.53 per ha) constituted around 31.92 per cent to the total cost (Cost C3). Cost incurred on input materials was observed to be Rs. 19696.38 per ha with 27.33 per cent of the total cost (Cost C3) of production. The other costs accounted for 31.65 per cent of the total cost (Cost C3). A perusal of the table further reveals that human labour (family and hired), rental value and seed were the important items of cost in the area.

Returns from pea production are also shown in table 1. It could be seen from the table, that the average pea yield was found to be 106.97 quintals per ha. The gross income was figured as Rs. 112649.50 per ha. The net return per ha over total cost i.e., cost C3 was found to be Rs. 40589.54 per ha. The net return over direct cost i.e., cost A1 was found to be Rs. 83495.04 per ha. The ratio of gross return to the cost C3 was calculated as 1.56 indicating that there was Rs. 0.56 net profit for every one rupee investment in pea production.

Costs and returns in cabbage cultivation (Rs/ha)

Costs of cabbage production are presented in table 2 and the percentage share of various costs to the total cost (Cost C3) is also given in the table. The total cost of production i.e., cost C3 was found to be about Rs. 74008 per ha. The cost A1 which was the cost actually paid by the farmers was found to be Rs. 28035.79 per ha. The operational cost and material cost accounted for 35.97 per cent and 22.56 per cent of cost C3 and were estimated to be Rs. 26623.18 per ha and Rs.16699.50 per ha, respectively. Intensive labour employment is renowned as peculiar to vegetable production and the contribution of human labour was recorded to be 32.55 per cent of cost C3. It was found to be Rs. 24086.95 per ha. Table 2 also revealed that rental value was the next most important item of cost with Rs. 16666.67 per ha i.e., 22.52 per cent of cost C3. Seed and expenditure on manure and fertilizers were the other important items of cost with Rs. 5634.78 per ha and Rs. 4673.32 per ha.

The returns over various costs of cabbage production are presented in table 2. The average cabbage yield was 169.71 quintals per hectare. The gross returns for cabbage production was found to be Rs. 92661.59 per ha where as the net returns over cost C3 was Rs. 18653.12 per ha. The ratio of gross returns to the total cost (cost C3) was found to be 1.25 in cabbage production indicating that there was a net profit of Rs. 0.25 for each one rupee investment.

Costs and returns in tomato cultivation (Rs/ha)

The perusal of table 3 revealed the costs of production of tomato. The total cost of production i.e., cost C3 was Rs. 125003.91 per ha. The operational cost accounted for about 41.04 per cent to the total cost (Cost C3) with expense of 51313.55. Cost incurred on input materials was observed to be Rs. 38589.77 per ha with 30.87 per cent of the total cost (Cost C3). The other costs, which include interest on working capital, rental value of land, depreciation and interest on fixed capital, were estimated at Rs. 23736.58 per ha sharing about 18.98 per cent of cost C3. A perusal of table further reveals that of total human labour cost, cost of family labour accounted for 35.42 per cent whereas hired labour contributed only 3.25 per cent of cost C3. Rental value of land and seed were the other important cost items.

Table 3 showed that per ha gross returns was estimated at Rs. 150562.71 per ha. The net returns over total cost (Cost C3) were

amounting to Rs. 25558.79 per ha. It also revealed that the ratio of gross return to cost C3 was 1.20 indicating that there was a net profit of Rs. 0.20 for each one rupee investment.

Costs and returns in bean cultivation

Table 4 reveals that bean production was a profitable proposition in the study area. The component-wise various cost incurred in the production of bean is given in the table. A perusal of the table reveals that the cost incurred in labour was the highest amounting to Rs. 26949.80 per ha i.e., 25.99 per cent to the cost C3. The total material costs i.e., costs on seeds, fertilizers and manure, irrigation and plant protection chemicals were found to be Rs. 15793.72 per ha. The per hectare costs of cultivation was found to be about Rs. 103690. The other costs accounted for 22.17 per cent of the total cost (Cost C3).

Table.1 Costs and returns in pea cultivation (Rs/ha)

S.No.	Particulars	Values	Percentage to Cost C3
A.	Operational cost		
1.	Human labour		
a.	Hired labour	3968.253968	5.506844565
b.	Family labour	16712.01814	23.19168254
	Sub-total	20680.27211	28.6985271
2.	Bullock labour		
a.	Hired bullock labour	1558.956916	2.163403222
b.	Owned bullock labour	765.3061224	1.062034309
	Sub-total	2324.263039	3.225437531
	Total	23004.53515	31.92396463
B.	Material cost		
1.	Seed	9158.730159	12.70979726
2.	Manure	1853.741497	2.572483104
3.	Fertilizers	5187.188209	7.198389877
4.	Plant protection	2295.918367	3.186102927
5.	Irrigation	1200.80619	1.666388567
	Total	19696.38442	27.33316173
C.	Other costs		
1.	Rental value of owned land	16666.67	23.1287518
2.	Depreciation on fixed assets	2383.34	3.307420097
3.	Interest on fixed assets	2975.86	4.129674814
4.	Interest on working capital	782.6608088	1.086117838
	Total	22808.53081	31.65196455
D.	Total cost of production at:		
1.	Cost A1	29154.90224	40.45898176
2.	Cost A2	29154.90224	40.45898176
3.	Cost B1	32130.76224	44.58865657
4.	Cost B2	48797.43224	67.71740837

5.	Cost C1	48842.78038	67.78033911
6.	Cost C2	65509.45038	90.90909091
7.	Cost C2*	65509.45038	90.90909091
8.	Cost C3	72060.39542	100
E.	Yield (Qtl. / ha.)	106.9727891	
F.	Selling price (Rs. /Qtl.)	1053.717949	
G.	Gross returns	112649.9433	
H.	Net returns over:		
1.	Cost A1	83495.04107	
2.	Cost A2	83495.04107	
3.	Cost B1	80519.18107	
4.	Cost B2	63852.51107	
5.	Cost C1	63807.16293	
6.	Cost C2	47140.49293	
7.	Cost C2*	47140.49293	
8.	Cost C3	40589.54789	
	Net returns	40589.54789	
	Returns per rupee invested	1.563271235	

Table.2 Costs and returns in cabbage cultivation (Rs/ha)

S.No	**Particulars**	**Values**	**Percentage to Cost C3**
A.	Operational cost		
1.	Human labour		
a.	Hired labour	4898.55	6.61
b.	Family labour	19188.40	25.93
	Sub-total	24086.95	32.55
2.	Bullock labour		
a.	Hired bullock labour	1557.97	2.10
b.	Owned bullock labour	978.26	1.32
	Sub-total	2536.23	3.42
	Total	26623.18	35.97
B.	Material cost		
1.	Seed	5634.78	7.61
2.	Manure	1521.73	2.05
3.	Fertilizers	3151.59	4.25
4.	Plant protection	3881.15	5.24
5.	Irrigation	2510.33	3.39
	Total	16699.60	22.56
C.	Other costs		
1.	Rental value of owned land	16666.67	22.52
2.	Depreciation on fixed assets	2573.42	3.47

3.	Interest on fixed assets	3389.56	4.58
4.	Interest on working capital	1327.98	1.79
	Total	23957.63	32.37
D.	Total cost of production at:		
1.	Cost A1	28035.79	37.88
2.	Cost A2	28035.79	37.88
3.	Cost B1	31425.35	42.46
4.	Cost B2	48092.02	64.98
5.	Cost C1	50613.76	68.39
6.	Cost C2	67280.43	90.91
7.	Cost C2*	67280.43	90.91
8.	Cost C3	74008.47	100
E.	Yield (Qtl. / ha.)	169.71	
F.	Selling price (Rs. /Qtl.)	544.21	
G.	Gross returns	92661.59	
H.	Net returns over:		
1.	Cost A1	64625.79	
2.	Cost A2	64625.79	
3.	Cost B1	61236.23	
4.	Cost B2	44569.56	
5.	Cost C1	42047.83	
6.	Cost C2	25381.16	
7.	Cost C2*	25381.16	
8.	Cost C3	18653.12	
	Net returns	18653.12	
	Returns per rupee invested	1.25	

Table.3 Costs and returns in tomato cultivation (Rs/ha)

S.No.	**Particulars**	**Values**	**Percentage to Cost C3**
A.	Operational cost		
1.	Human labour		
a.	Hired labour	4067.79	3.25
b.	Family labour	44279.66	35.42
	Sub-total	48347.45	38.67
2.	Bullock labour		
a.	Hired bullock labour	1800.84	1.44
b.	Owned bullock labour	1165.25	0.93
	Sub-total	2966.10	2.37
	Total	51313.55	41.05
B.	Material cost		
1.	Seed	15985.16	12.78
2.	Manure	1954.44	1.56

3.	Fertilizers	6805.08	5.44
4.	Plant protection	6334.74	5.06
5.	Irrigation	7510.33	6.00
	Total	38589.77	30.87
C.	Other costs		
1.	Rental value of owned land	16666.67	13.33
2.	Depreciation on fixed assets	2469.23	1.97
3.	Interest on fixed assets	2952.65	2.36
4.	Interest on working capital	1648.03	1.31
	Total	23736.58	18.98
D.	Total cost of production at:		
1.	Cost A1	49740.94	39.79
2.	Cost A2	49740.94	39.79
3.	Cost B1	52693.59	42.15
4.	Cost B2	69360.26	55.48
5.	Cost C1	96973.25	77.57
6.	Cost C2	113639.92	90.90
7.	Cost C2*	113639.92	90.90
8.	Cost C3	125003.91	100
E.	Yield (Qtl. / ha.)	155.50	
F.	Selling price (Rs. /Qtl.)	981.50	
G.	Gross returns	150562.71	
H.	Net returns over:		
1.	Cost A1	100821.76	
2.	Cost A2	100821.76	
3.	Cost B1	97869.11	
4.	Cost B2	81202.44	
5.	Cost C1	53589.45	
6.	Cost C2	36922.78	
7.	Cost C2*	36922.78	
8.	Cost C3	25558.79	
	Net returns	25558.79	
	Returns per rupee invested	1.20	

Table.4 Costs and returns in bean cultivation (Rs/ha)

S.No.	**Particulars**	**Values**	**Percentage to Cost C3**
A.	Operational cost		
1.	Human labour		
a.	Hired labour	4131.27	3.98
b.	Family labour	22818.53	22.00
	Sub-total	26949.80	25.99
2.	Bullock labour		

a.	Hired bullock labour	1061.77	1.02
b.	Owned bullock labour	1351.35	1.30
	Sub-total	2413.12	2.32
	Total	29362.93	28.31
B.	Material cost		
1.	Seed	7374.51	7.11
2.	Manure	1795.36	1.73
3.	Fertilizers	2549.80	2.45
4.	Plant protection	2557.91	2.46
5.	Irrigation	1516.12	1.46
	Total	15793.72	15.23
C.	Other costs		
1.	Rental value of owned land	16666.67	16.07
2.	Depreciation on fixed assets	2436.87	2.35
3.	Interest on fixed assets	3054.80	2.94
4.	Interest on working capital	836.29	0.80
	Total	22994.63	22.17
D.	Total cost of production at:		
1.	Cost A1	51724.80	49.88
2.	Cost A2	51724.80	49.88
3.	Cost B1	54779.60	52.82
4.	Cost B2	71446.27	68.90
5.	Cost C1	77598.13	74.83
6.	Cost C2	94264.80	90.90
7.	Cost C2*	94264.80	90.90
8.	Cost C3	103691.28	100
E.	Yield (Qtl. / ha.)	99.51	
F.	Selling price (Rs. /Qtl.)	1177.22	
G.	Gross returns	114464.38	
H.	Net returns over:		
1.	Cost A1	62739.57	
2.	Cost A2	62739.57	
3.	Cost B1	59684.77	
4.	Cost B2	43018.10	
5.	Cost C1	36866.24	
6.	Cost C2	20199.57	
7.	Cost C2*	20199.57	
8.	Cost C3	10773.09	
	Net returns	10773.09	
	Returns per rupee invested	1.10	

A perusal of the table 4 further reveals that human labour (family and hired), rental value and seed were the important items of cost in the area.

The gross returns were Rs. 114464.38 per hectare giving a net return of Rs. 10773.09 per hectare. The ratio of gross returns to the

cost C3 was calculated as 1.10 indicating that there was Rs. 0.10 net profit for every one rupee investment in bean production.

In conclusion, sectors like horticulture (both fruit and vegetable cultivation) have a comparative advantage in the region due to its agro-climatic conditions. The analysis of profitability of 4 major vegetables grown in Nainital district showed that it is advantageous to adopt vegetable production. The returns per rupee invested from pea, cabbage, tomato, and bean were 1.56, 1.25, 1.20 and 1.10 respectively. Thus, it is highly recommended to farmers to grow vegetables in hilly region like Uttarakhand.

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