III. CULTIVATION OF OFF-SEASON VEGETABLES

Methodology of Assessment and Main Findings

This portion of the paper is based on the quick survey of 40 off-season vegetable growers spread over Solan and Shimla districts of the State. Selected off-season vegetable growers have been sub-divided into three categories marginal (having less than 1 ha of operational holding), small (1-2 ha), and farms having more than 2 ha. The land utilization pattern of sampled farmers indicated that marginal farmers are putting more area under vegetables than small farmers and those having more than 2 ha of operational holding. Multiple cropping index and relative vegetable crop index were also found to be higher on marginal farms. Diversification of cropping pattern to avert risk and uncertainty is the main reason for a lower proportion of area under vegetable crops. Marginal farmers are putting more area under vegetables to have more income as well as to provide more employment to the family members [Table 3(a)].

Among the various off-season crops grown by the sampled farmers, tomatoes occupy prime position followed by peas, capsicums, and french beans. Proportionate area under these crops, except capsicums, has not indicated any definite pattern associated with the size of holding (Table 3(b)). Analysis of the cropping patterns followed by the sampled households indicated that farmers are still following the traditional subsistence agriculture by retaining 70 per cent or more of their land under food crops even in the high potential off-season vegetable growing pockets. This means that there is still considerable scope for future expansion of vegetable cultivation (and resulting increases in employment and income) in the future.

Table 3(a): Land Utilization and Cropping Pattern Followed by Sample Farmers

Particulars	Marginal Farms	Small Farms	More than 2 ha.
A. Area under (Percentage):			
1) Cultivation	68.99	69.07	58.28
2) Orchard	1.55	7.81	6.98
3) Ghasni	28.68	19.78	30.28
4) Fallow	0.78	3.34	4.46
Total Area (in ha.)	1.00	2.00	5.04
B. Irrigated area (%)	15.87	21.31	14.21
C. Distribution of cultivated area between arable crops (%):			
1) Food crops	71.92	75.70	70.67
2) Off-season vegetable crops	20.09	15.25	17.87
3) Other crops	7.99	9.05	11.46
D. Multiple cropping index	162.12	158.87	159.31
E. Relative Vegetable Crop Index	32.43	24.26	28.69

(i) Relative Vegetable Crop index = MCI x percentage area under crop or Total area under off-season vegetable crop.
Net area sown = 100.

Table 3(b): Share of Vegetable Species in Total Area under Off-season Vegetables

(In percentage)

	Crop/size of farm	Marginal	Small	Medium
1.	Tomato	44.74	48.12	51.14
2.	Peas	40.44	38.17	40.13
3.	Capsicum	12.66	4.17	2.17
4.	French beans	2.16	3.68	1.71
5.	Cabbage	-	3.73	2.10
6.	Cauliflower	-	2.13	2.75

Information on the types and varieties of vegetable crops grown, their sowing and harvesting seasons, and supply position in the terminal market has been summarised in Table 4. Assessment of the table indicates that except for tomatoes, and here too for an only brief period between 15th July to 15th August, there is no competition in the domestic and outside markets. Thus, Himachal farmers are assured of remunerative prices for their off-season vegetables.

Cultivation Practices

Off-season growers in the study area prepared the field according to the requirement of vegetable crops concerned. Generally, they plough the land three to four times by using a traditional plough followed by planking. Before starting the last ploughing they spread well-prepared farm yard manure and basal dose of chemical fertilizers particularly superphosphate and potash. They transplant/sow their vegetables according to the recommended distance. In the case of transplanted crops, they are watered twice a day till the plants are established properly, thereafter irrigation is given according to the need and availability of irrigation water.

Makhan Beans (French Beans) are generally grown as an inter-crop with tomatoes (irrigated) to have an additional income. This practice is generally followed in irrigated areas after having 3 to 4 pickings of tomatoes. Beans are sown in between the lines of tomatoes in the month of July to the first week of August and the farmers save labour to be used for staking as well as on field preparation. Besides this, it helps in enhancing soil fertility by nitrogen fixation.

Input use: Farmers of the area are not applying the recommended doses of farm yard manure and chemical fertilizers as is evident from Table 5. The reasons for not adopting the recommended dose of farm yard manure is non-availability of it in the desired quantity and they prefer to apply the available FYM on each and every field they own. Lack of finance is reported to be one of the main constraints for fuller adoption of chemical fertilizers and FYM. Besides this, non-availability and lack of technical knowledge is also responsible for this state of affairs. Although farmers are conscious about the protection of their vegetable crops from pests and diseases, they fail to achieve the desired goal even after spending a good amount of money on it. Lack of technical knowledge about plant protection measures is the main cause of it.

Employment Potential

One of the problems that besets the hill economy is to provide gainful employment to the rural work force. The reasons for rural unemployment in the hills are lack of industrial development, lack of skills, and the absence of proper diversification of farming activities.

Table 4: Off-season Vegetable Crop Species/Varieties Grown Under Irrigated and Un-irrigated Conditions in Himachal Pradesh

Off-season Vegetable Species	Variety	Irrigated condition		Un-irrigated condition		Market situation in Delhi
		Sowing/ planting	Harvesting	Sowing/ planting	Harvesting	
Tomato	Solangola	Feb-Mar	Jun-Aug	May-June	Aut-Oct	June-mid July no competition - Tomato from Maharastra & Gujarat mid-July to mid-August competition with Himachal produce. No competition between mid-Aug to Oct.
	Gold Maker	Feb-Mar	Jun-Aug	May-June	Aug-Oct	
	Yaswant (A-2)	Feb-Mar	Jun-Aug	May-June	Aug-Oct	
Capsicum	Californiawonder	Feb-Mar	Jun-Aug	Apr-May	Jul-Oct	No competition
Bean	Contender	Feb-Mar	May-Jul	Jul-Aug	Sep-Oct	No competition
	Kentuky Wonder	Mar-Apr	Jun-Aug	Jun-Jul	Sep-Oct	No competition
	French Bean (Pole)	Feb-Mar	Jun-Aug	Jun-Jul	Sep-Oct	
Peas Mid-hills	Arkal	Aug-Sep	Oct-Nov	Aug-Sep	Oct-Nov	No competition
	Lincoln	Oct-Nov	Mar-May	-	-	No competition
High-hills	Lincoln	November	Jun-Jul	-	-	No competition
	Arkal	Mar-May	Jul-Oct	-	-	No competition
	Arkal	-	-	Jul-Aug	Sep-Oct	
	Kinnauri	Apr-May	Jul-Sep	Apr-May	Jul-Sep	No competition
Cauliflower						
Mid-hills	Snow king	November	Mar-Apr	-	-	Punjab produce
	Sawan Bhadon	May	Aug-Sep	-	-	No competition
High-hills	Snowball	April	Jul-Sep	-	-	No competition
Cabbage						
Mid-hills	Pride of India & Golden Acre	Feb-Mar	May-Jun	July	Sep-Nov	No competition
High-hills	Pride of India & Golden Acre	Mar-Apr	Jun-Aug	-	-	No competition
	Large late drum Head	May-Jun	Sep-Oct	Jun-Jul	Aug-Sep	No competition

Source: Survey of the vegetable growing areas in Himachal Pradesh.

Table 5: Deviation in Actual Use of Farm Yard Manure and Chemical Fertilizer in the Study Area

Crop	Recommended doses kg/ha				Doses actually applied by farmers (percentage of recommended doses)			
	FYM '000	N	P	K	FYM	N	P	K
Tomato	25	60	30	30	40	67	50	50
Capsicum	25	100	75	50	40	15	13	10
Beans	25	50	100	50	20	-	3	-
Peas	25	25	75	75	20	-	6	-
Cauliflower	20	125	60	30	50	8	17	17
Cabbage	25	125	60	30	40	8	17	17

Source: Packages of Practices for Kharif Crops 1985, Directorate of Extension Education, HPKVV, Palampur.

Note: FYM in tons
N,P,K in kg

Shift in the existing cropping system in agriculture provides ample opportunities for generating employment in rural areas. Expansion of area under off-season vegetables is one of the best propositions in this regard. The labour requirement of off-season vegetables, cereals, and fruit crops grown in the State indicated that on an average human labour requirement for almost all the off-season vegetable crops is higher than that for other crops. Among off-season vegetables, the labour requirement for tomatoes is estimated to be the highest (1016 man-days per ha) and the lowest in case of beans (236 man-days) as against wheat, maize, and paddy which require only 126, 114, and 160 man-days respectively (Fig. 1).

Per hectare requirement of human labour for conducting various farm operations has been estimated and is presented in Fig. 2. Interculture operations provide maximum man-days of employment to the farm families followed by irrigation, plant protection measures, preparatory tillage, and harvesting and sowing in the cultivation of tomatoes. Requirement of human labour has been found to be the highest for performing interculture and harvesting of beans and peas followed by cauliflowers and cabbages. Peas and beans cultivation invariably requires staking and this operation is labour intensive.

This suggests that cultivation of off-season vegetables on commercial scale generates more employment opportunities for the farmers of the hilly areas than the cultivation of cereals and a number of other crops.

FIGURE: 1

HUMAN LABOUR REQUIREMENT PER HECTARE FOR VEGETABLES AND COMPARATIVE CROPS

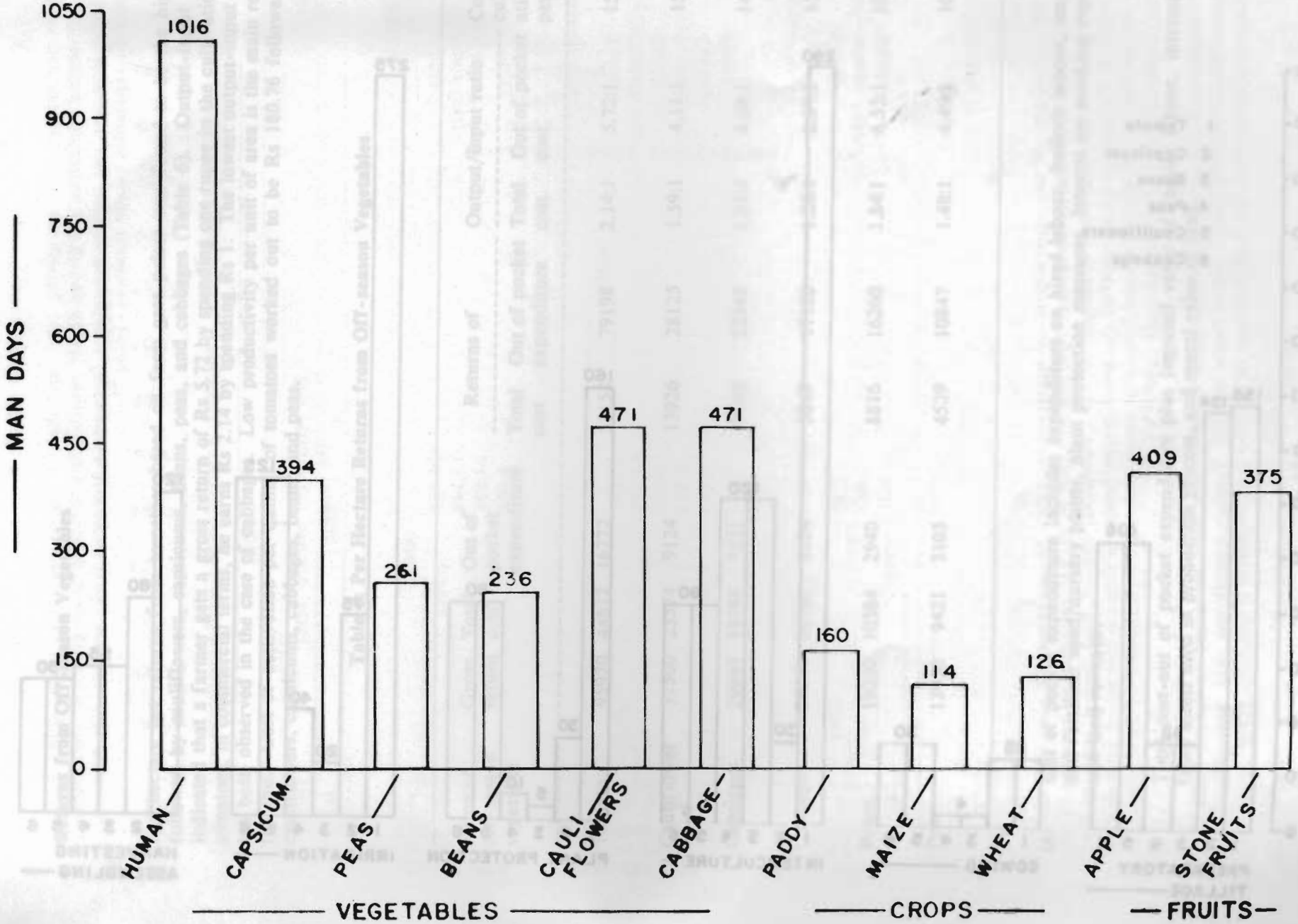
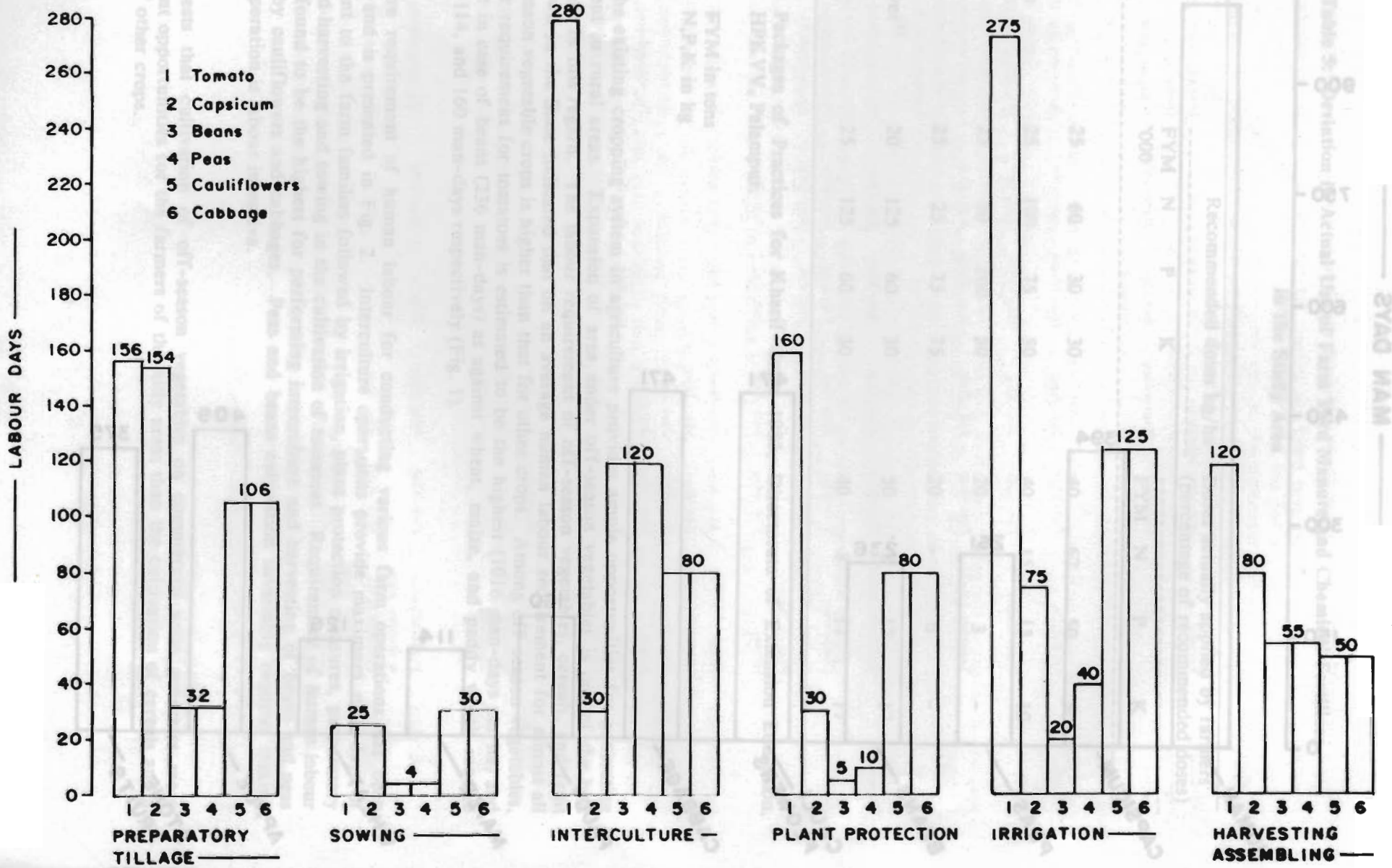


FIGURE: 2 OPERATION-WISE LABOUR REQUIREMENT



Returns from Off-season Vegetables

Per hectare net returns from tomatoes based on farm gate prices was found to be the highest followed by cauliflowers, capsicums, beans, peas, and cabbages (Table 6). Output-input ratio indicated that a farmer gets a gross return of Rs 5.72 by spending one rupee in the cultivation of tomatoes, in commercial terms, he earns Rs 2.14 by spending Rs 1. The lowest output-input ratio has been observed in the case of cabbages. Low productivity per unit of area is the main reason for this. Cost of cultivation per quintal of tomatoes worked out to be Rs 180.76 followed by cauliflowers, capsicums, cabbages, beans, and peas.

Table 6: Per Hectare Returns from Off-season Vegetables

Name of off-season vegetable	Gross return	Total cost	Out of pocket expenditure	Returns of		Output/input ratio		Cost of cultivation per Qtl
				Total cost	Out of pocket expenditure	Total cost	Out of pocket cost	
Tomato	95970	44812	16772	51158	79198	2.14:1	5.72:1	158
Cauliflower	37500	23574	9124	13926	28125	1.59:1	4.11:1	157
Capsicum	29865	19786	7321	10080	22545	1.51:1	4.08:1	146
Cabbage	26250	20761	9124	5849	17126	1.26:1	2.87:1	138
Beans	19200	10384	2940	8816	16260	1.84:1	6.53:1	108
Peas	13950	9421	3103	4529	10847	1.48:1	4.49:1	105

(a) Out of pocket expenditure includes expenditure on hired labour, bullock labour, manure and fertilizer seed/nursery plants, plant protection measures, interest on working capital, and land revenue.

(b) Total cost-out of pocket expenditure plus imputed value of family labour, interest on fixed assets used in production process, and rental value of land.

Returns per hectare from competing crops and the off-season vegetables under study indicated that off-season vegetables are giving higher returns than the food crops grown by the farmers of the area. However, per hectare net returns from apple and stone fruits are generally higher than off-season vegetables except tomatoes (Table 7).

Table 7: Net Returns from Fruit, Vegetable and Cereal Crops

Crops	Net returns per hectare (in rupees)
Fruit crops	
Apple	14,586
Stone fruit	13,248
Kinnow	14,056
Orange	8,064
Vegetable crops	
Tomato	51,157
Cauliflower	13,929
Capsicum	10,079
French beans	8,815
Cabbage	5,489
Peas	4,528
Cereals	
Maize	230
Wheat	461
Paddy	421

Cost Structure

In the cultivation of any agricultural or horticultural crop, the quantum of total cost mainly depends on the use of different inputs. Paid out cost (out of pocket cost) ranged between 28 per cent (Beans) and 44 per cent (Cabbage) of the commercial cost of land (rental value of land estimated at the rate of 25 per cent of the gross return from the crop) is the major item of total cost in the case of all the off-season vegetable crops under study, followed by expenditure on labour, material cost, and over head costs (ANNEX).

Per hectare expenditure on plant protection measures has been estimated to be the highest in tomatoes (Rs 4,500) and the lowest in beans (Rs 40). Tomato, cauliflower, and cabbage crops are getting more attention as far as application of manure and fertilizers is concerned (Fig. 3).

FIGURE: 3 OUT OF POCKET EXPENDITURE ON CRITICAL INPUTS