

## Profitability Analysis of Vegetable Growers vis-a-vis Farm Size in Punjab

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**ABSTRACT** To conduct the study primary data was collected from sixty vegetable growers through multi-stage sampling technique of the crop year 2008-09. For sample selection, two top ranking districts, namely Hoshiarpur and Jalandhar, in terms of vegetable acreage and production were selected. Further, two blocks from each district and later two villages from each block, giving a total of eight villages were selected. While the final stage represented a sample of 60 farmers categorized into small (<2 hectares  $\pm$  5.0 acres), medium (2-4 hectares  $\pm$  5.0-10.0 acres) and large (>4 hectares  $\pm$  10 acres). It was found that small farmers were more into vegetable farming with 66.3 per cent area under vegetables as percent of operational area which resulted in significant high farm income per acre of GCA, to be Rs. 20305 per annum, in comparison to medium (Rs. 15748) and large (Rs. 14863) farmers. As vegetables are short duration crops mostly grown by small farmer, the cropping intensity of small farmers was 281 per cent giving them higher farm income per acre of NSA which was recorded as Rs. 57771 per annum, which was significantly higher ( $p < 0.01$ ) than that observed in the case of medium (Rs. 35607 per annum) and large (Rs. 33945 per annum) farmers. The small farmers had larger proportion (78.3 %) of income from vegetable farming in total farm income which commensurate with the large share of vegetable crops (58.1 %) in GCA. However, a difference was observed in absolute terms with respect to variable cost and net returns for different vegetables but the application of analysis of variance confirmed non-significant differences between different categories of farmers.

### INTRODUCTION

The significance of vegetables, in improving the nutritional and economic status needs no elaboration. Vegetable farming has a number of advantages, like the vegetable cultivation employs more number of persons and produces more tonnage per unit of area as compared to traditionally grown crops. India has been growing vegetables for several centuries and is the second largest producer of vegetables in the world (after China), accounting for roughly 14 percent of the world's production. In Punjab the production of vegetables in 2011-12 stands at over 37.3 lakh metric tonnes from an area of 1.92 lakh hectares (Anonymous 2012). It is being increasingly realized that enhancing vegetable production would ensure the fulfillment of the objective of household food, nutritional and economic security in a single go. The issue of economic security is of utmost importance for

India's farming community in general and small and marginal farmers in particular.

In fact, small land holdings have dominated the Indian agriculture scene in the past, and this trend is likely to continue in the future as well. It was estimated that small landholders would account for as much as 83 per cent of the total landholders by 2010-11, as compared to 63 per cent in 1960-61 and 81 percent in 2000-01 (Jha 2001). The small landholders are poor, usually undernourished and poverty stricken; and by and large practice subsistence agriculture. They have limited financial resources and are not able to grow major crops like wheat, sugarcane, rice, etc due to long gestation period of these crops. Their plight calls for urgent need to augment their income for ensuring food security and alleviating poverty. The growing demand for vegetables is considered to have favorable economic effect on small holders who dominate the Indian agriculture scenario. They have a distinct advantage in vegetable production as vegetable cultivation is labor intensive and small holders have abundant labor. They have small land holdings and can make use of the land more intensively, as vegetables are short duration crops and provide regular income to meet the day to day requirements of the family.

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Besides, with a view to advantage of opportunities arising out of agricultural diversification toward vegetable farming particularly for small holders, it is important to assess the profit and income of vegetable growers of different farm sizes and particularly the small holders for whom it is being promoted and are being diversified. However, considering various aspects of vegetable farming and its role in the economic uplifting of farming community and the small farmers' particularly, the study is administrated in Punjab to assess the remunerative worth of vegetable farming vis-à-vis size of farm categorized into small (<2 hectares) medium (2-4 hectares) and large (>4 hectare) size groups on the basis of their operational land holdings.

### METHODOLOGY

A scientific methodology is a pre-requisite for conducting a research study as it adds to clarity, precision and validity of the findings relating to the research problem. The primary data used, collected from vegetable growers pertains to the crop year 2008-09. Multi-stage sampling technique was used where the selection of Hoshiarpur and Jalandhar Districts (having maximum area and production of vegetables in Punjab in crop year 2008-09.) marked the first stage in the four stage sampling technique adopted for the selection of vegetable growers, that is, the ultimate sampling units. In the second stage, based upon the criteria of more area under vegetable farming as compared to other blocks two blocks each, that is, Jalandhar East and Aadampur from Jalandhar district and Hoshiarpur-1 and Hoshiarpur-2 in Hoshiarpur district were selected. For the selection of villages at the third stage, villages Partap-Pura and Wadala were selected from Jalandhar East block while Aalawalpur and Thogri villages represented Aadampur block.

**Table 2: Land holding details of the selected vegetable growers**

Particulars	Small		Medium		Large		Overall	
	N	Acre house-hold <sup>-1</sup>	N	Acre house-hold <sup>-1</sup>	N	Acre house-hold <sup>-1</sup>	N	Acre house-hold <sup>-1</sup>
Owned area	18	2.53	20	7.50	20	16.50	58	8.84
Leased-in area	2	0.11	6	1.40	5	2.40	13	6.01
Leased-out area	0	0.00	2	0.50	2	0.55	4	5.25
Operational area	2.64	8.40	18.35	9.79				
Area under vegetables	1.75	3.50	8.50	4.58				
% of operational area	66.35	41.67	46.32	46.79				

However. Hussainpur and Bhagowal were selected from Hoshiarpur-1 block while Bohan and Boothgarh were from Hoshiarpur-2 block.

For each of the villages, the list of all the farmers growing vegetables was prepared with the help of ADO's/ HDO's and village leaders. Using national farm size classification, the farmers were categorized into marginal (<1 hectare  $\pm$  2.5 acres), small (1-2 hectares  $\pm$  2.5-5.0 acres), semi-medium (2-4 hectares  $\pm$  5.0-10.0 acres), medium (4-10 hectares  $\pm$  10.0-20.0 acres) and large (>10 hectare  $\pm$  25 acres) size groups on the basis of their operational land holdings. From them sixty vegetable growers were selected. The details of selected vegetable growers, spread equally over the two districts, have been presented in Table 1.

**Table 1: Selection of respondents**

Farm size	Sample selected	Category
Marginal	20	Small
Small		
Semi-medium	20	Medium
Medium	20	Large
Large		

Thus twenty farmers per category were used for the study. The personal interview of the selected respondents, through a specially structured interview schedule, was the preferred mode of primary data collection. The data collected was subjected to statistical analysis for the meaningful presentation of the results.

### RESULTS AND DISCUSSION

#### Land Holding Details

The land holding details with respect to selected vegetable growers presented in Table 2

show that the average size of the operational holding in case of the small land holders was 2.64 acres, whereas the corresponding figure for medium and large farmers stood at 8.40 and 18.35 acres respectively. Two small holders, who didn't own any land, on an average leased in 1.13 acres of land, which accounted to 0.11 acres per household. A total of six (30 %) medium farmers and five (25 %) large farmers had leased-in the land, which on an average per household stood at 1.40 and 2.40 acres respectively. Two farmers each of medium and large land holding category had leased-out the land resulting into half an acre per household. It was been observed that area put to vegetable cultivation varied directly with the size of land holding, but the area under vegetables as percent of operational area has been recorded to be the highest, that is, 66.3 percent in case of small farmers, followed by 46.3 percent in case of large and 41.7 percent in case of medium farmers.

**Vegetable Acreage in Relation to Size of the Operational Holding**

The data regarding vegetable acreage as percentage of operational area presented in Table 3 reveals that a vast majority of medium (70

%) and large (58 %) farmers had cultivated vegetables on one third to two third of their operational holding. Nearly 65 percent of the small land holders had apportioned more than two third of their operational holdings to vegetable cultivation. This percentage stood at only 5 percent for medium and 10 percent for large category vegetable growers. It seems plausible to assume that small and marginal farmers have started realizing the remunerative worth of vegetables. Moreover, smaller farm size makes it easier for them to monitor more vigilantly the farm operations involved in vegetable farming.

**Vegetable Cultivation Details**

The information in the Table 4 includes the proportion of selected farmers cultivating a particular vegetable crop and the area apportioned to that. The results reveal that the selected respondents had grown four vegetable crops in winter and five in summer. In case of winter vegetables, cauliflower was grown by 50 percent of small and 60 percent of medium farmers, thus making it the most preferred choice of small and medium farmers. The cauliflower acreage recorded per grower stands at 1.5 acres for small and 3.25 acres for medium farm holders. Potato was

**Table 3: Distribution of sampled vegetable farms according to vegetable acreage**

Vegetable acreage as percent of operational area	Small		Medium		Large		Overall	
	No.	%	No.	%	No.	%	No.	%
< 33	1	5.0	5	25.0	3	15.0	9	15.0
33-66	6	30.0	14	70.0	15	75.0	35	58.3
≥ 66	13	65.0	1	5.0	2	10.0	16	26.7

**Table 4: Vegetable cultivation details with respect to selected vegetable growers**

Particulars	Small		Medium		Large		Overall	
	No. (%)	Area, acre*	No. (%) No. (%)	Area, acre*	No. (%)	Area, acre*	No. (%)	Area, acre*
<i>Winter</i>								
Potato	7(35.0)	1.82	7(35.0)	3.43	10(50.0)	8.30	24(40.0)	4.99
Cauliflower	10(50.0)	1.50	12(60.0)	3.25	7(35.0)	5.00	29(48.3)	3.07
Carrot	4(20.0)	2.00	5(25.0)	3.80	5(25.0)	6.00	14(23.3)	4.07
Pea	8(40.0)	1.88	6(30.0)	3.33	6(30.0)	7.83	20(33.3)	4.10
<i>Summer</i>								
Tomato	5(20.0)	1.55	3(15.0)	3.00	3(15.0)	4.67	11(18.3)	2.80
Chilli	6(30.0)	1.88	7(35.0)	3.43	4(20.0)	4.50	17(28.3)	3.13
Okra	8(40.0)	1.53	4(20.0)	3.00	3(15.0)	4.00	15(25.0)	2.42
Brinjal	0	-	0	-	2(10.0)	4.00	2(3.3)	4.00
Bitter gourd	2(10.0)	1.00	0	-	0	-	2(3.3)	1.00

\*Per grower

grown by 35 percent each of small and medium farmers with average area of 1.82 and 3.43 acres respectively, while 50 percent of large farmers allocated 8.3 acres per grower. As many as half of the large and one- third each of small and medium farm holders had gone in for the cultivation of potato crop. Tomato, chilli and okra were the major summer vegetables grown by the sampled farmers. As many as 30 percent of small, 35 percent of medium and 20 percent of large farmers had been doing the cultivation of chilli with average area per grower being 1.88, 3.43 and 4.50 acres, respectively. In case of cultivation of tomato and okra, the predominance of small scale farmers has been conspicuous. Brinjal and bitter gourd was grown by only two farmers each.

### Remunerative Worth of Vegetable Farming

The choice of the vegetable farming as a diversification option lies in the remunerative worth of this venture. In this section, the contribution of vegetable farming to total farm income has been ascertained with a view to see if small farmers benefit more from vegetable farming, than their counterparts with larger holdings.

### Cost Return Structure of Vegetables

This sub- section is devoted exclusively to the study of cost and return structure of certain winter vegetables viz. potato, cauliflower, carrot and pea and summer vegetables like tomato, chilli, okra, brinjal and bitter gourd grown by the selected vegetable growers.

The cost return structure of all the vegetable grown on the respondents' farms was studied and is presented in Table 5. It was observed that

as regards the variable cost of potato cultivation in absolute terms, it has been observed to be the highest in case of medium (Rs. 24330 acre<sup>-1</sup>) farmers followed by large (Rs. 23442 acre<sup>-1</sup>) and small (Rs. 22847 acre<sup>-1</sup>) category farmers. These variable cost differentials were found to be non-significant statistically as enunciated by the application of ANOVA. The highest net returns over the variable costs accrued to the medium farmers (Rs. 15045 acre<sup>-1</sup>) and the lowest to small farmers (Rs. 10389 acre<sup>-1</sup>) although the category wise differences were tested to be non-significant statistically.

In case of cauliflower, the large farmers had the highest total variable cost of Rs 15546 acre<sup>-1</sup> followed by farmers of medium category with Rs. 14959 acre<sup>-1</sup> and the lowest for small farmers with Rs. 14404 acre<sup>-1</sup>. The highest net returns over the total variable cost from cauliflower cultivation have accrued to small farmers (Rs. 20644 acre<sup>-1</sup>) followed by Rs. 19844 acre<sup>-1</sup> to large and Rs. 18093 acre<sup>-1</sup> to medium farmers. The inter category differences in variable cost as well as the net returns over the total variable cost were found to be statistically non-significant.

The total variable cost for cultivation of carrot was the highest in case of large farmers (Rs. 15805 acre<sup>-1</sup>), second highest in case of medium farmers (Rs. 15630 acre<sup>-1</sup>) and the lowest in case of small farmers (Rs. 13949 acre<sup>-1</sup>). The net returns from carrot cultivation ranged from Rs. 29290 acre<sup>-1</sup> for large farmers to Rs. 31655 acre<sup>-1</sup> for small farmers. The application of analysis of variance confirmed non-significant differences between different categories with respect to variable cost and net returns.

The pea growers on an average expended Rs.18582 acre<sup>-1</sup> by way of production and

**Table 5: Costs and returns from vegetable cultivation in year 2008-09**

Vegetables	Total variable cost Rs. acre-1				Returns over variable cost Rs. acre-1			
	Small	Medium	Large	Overall	Small	Medium	Large	Overall
<i>Winter</i>								
Potato	22847	24330	23442	23867	10389	15046	10678	11867
Cauliflower	14404	14959	15546	14909	20644	18094	19845	19396
Carrot	13949	15630	15805	15213	31655	30670	29290	30458
Peas	18260	18853	18742	18582	26722	25168	22450	24974
<i>Summer</i>								
Tomato	18630	18500	17838	18379	67113	73800	67179	68955
Chili	32386	32211	32436	32326	24057	24310	22845	23876
Okra	13060	13031	13260	13092	22630	22244	19623	21926
Brinjal	-	-	13362	13362	-	-	79263	79263
Bitter gourd	10851	-	-	10851	14425	-	-	14425

marketing cost. The total variable cost was the highest in case of medium farmers (Rs. 18853 acre<sup>-1</sup>), second highest in case of large farmers (Rs. 18741 acre<sup>-1</sup>) and the lowest in case of small farmers (Rs. 18260 acre<sup>-1</sup>). The small farmers got the highest net returns of Rs 26721 acre<sup>-1</sup> followed by medium (Rs. 25168 acre<sup>-1</sup>) and large (Rs. 22449 acre<sup>-1</sup>) farm holders. The statistical analysis revealed that there were no significant differences in selected categories of land holders with respect to the variable cost and net returns from pea. The results are in consonance with those flowing from the study conducted by (Atibudhi 1999) who compared the cost structure of different vegetables cultivated in Uttaranchal and concluded that marginal farmers have lower cost of production in case of vegetables as compared to their counter parts with larger holdings.

The perusal of cultivation details of summer vegetables highlighted that for the cultivation of tomato the highest variable cost has been observed in the case of small farmers (Rs. 18630 acre<sup>-1</sup>) closely followed by medium (Rs. 18500 acre<sup>-1</sup>) and the lowest in case of large (Rs. 17838 acre<sup>-1</sup>) farmers. The net returns (Rs. 73800 acre<sup>-1</sup>) were found to be the highest in medium category farms, and more or less the same in case of large (Rs. 67179 acre<sup>-1</sup>) and small (Rs. 67113 acre<sup>-1</sup>) farm holders. However, the absolute differences found in different categories with respect to variable cost and net returns have been found non-significant statistically.

In case of chilli cultivation all the categories of farmers incurred more or less the same amount in absolute terms (Rs. 32386 acre<sup>-1</sup> for small, Rs. 32211 acre<sup>-1</sup> for medium and Rs. 32436 acre<sup>-1</sup> for large farm holders) as well as statistical terms by way of variable cost. The net returns accruing from chilli cultivation have been recorded as the highest for medium (Rs. 24310 acre<sup>-1</sup>) land holders followed by Rs. 24067 acre<sup>-1</sup> for small and Rs. 22845 acre<sup>-1</sup> for large farm holders, although these differences were found to be non-significant statistically.

The variable cost of okra cultivation has varied between Rs. 13032 acre<sup>-1</sup> for medium and Rs. 13260 acre<sup>-1</sup> for large farmers with production and marketing cost on an average accounting for 87 and 13 percent, respectively. The small farmers got the highest net returns to the tune of Rs. 22631 acre<sup>-1</sup> and the large farmers got the lowest, amounting to Rs. 19623 acre<sup>-1</sup>. The differences in the variable cost and net returns observed in

case of different land holding categories were not found to be significant statistically.

Brinjal has been grown by only 2 (10 %) vegetable growers belonging to large land holding category on an average of 4 acres per grower. The variable cost of Rs. 13362 acre<sup>-1</sup> and the gross returns to the tune of Rs. 92625 acre<sup>-1</sup> translated into net returns amounting to Rs. 79263 acre<sup>-1</sup>.

The cultivation of bitter gourd, which found place in the cropping pattern of only two small farmers, involved the total variable cost of Rs. 10851 acre<sup>-1</sup>, and resulted into the net returns over total variable cost to the tune of Rs. 14424 acre<sup>-1</sup>. The study conducted by (Adil et al. 2007) in Pakistan also demonstrated that summer vegetable growers with small land holdings have lower variable costs.

#### ***Family Income Details of Different Farm Categories***

This sub-section is devoted to the study of family income of the selected vegetable growers. The farm income includes the income from crop production. The net returns from each of the crops grown have been added to arrive at the farm income. The non-farm income includes income from non-farm occupations and the remittances received from the family members settled abroad. The split up of the family income into farm and non-farm income has been presented in Table 6.

The perusal of the table reveals that vegetable growers were having annual income of Rs 4.13 lakhs, out of which farm income constituted 84 percent and the remaining 16 percent accrued from non-farm sources. As is logically expected the family income of the selected vegetable growers varied directly with the farm size. The annual income is observed to be the highest (Rs 6.28 lakh) in case of large farmers followed by medium (Rs 3.8 lakh) and small (Rs 2.29 lakh) farmers. The three categories of farmers differed significantly ( $p < 0.01$ ) with respect to their income. A similar trend is observed in case of farm income which contributed the highest (95.5 %) to family income in case of large farmers, followed by 78.3 percent in case of medium and 61.4 percent in case of small farmers. In absolute terms, the annual non-farm income of small farmers (Rs. 88500) has been observed to be the highest, closely followed by that of medium (Rs. 82500) and the lowest (Rs. 28500) in case of large farmers. The

**Table 6: Annual family incomes of vegetable growers Rupees year<sup>-1</sup>**

Source	Small	Medium	Large	Overall
Farm income	140682 <sup>c</sup> (61.4)	298002 <sup>b</sup> (78.3)	599694 <sup>a</sup> (95.5)	346126 (83.9)
Non-farm income	88500 <sup>a</sup> (38.6)	82500 <sup>a</sup> (21.7)	28500 <sup>a</sup> (4.5)	66500 (16.1)
Total income	22918 <sup>c</sup>	380502 <sup>b</sup>	628194 <sup>a</sup>	412626

Figures in parentheses indicate percentages

<sup>a,b,c</sup> figures with different superscripts in a row differ significantly ( $p < 0.05$ )

difference in the non-farm income of vegetable growers of different land holding categories have been found to be non-significant ( $p < 0.01$ ) statistically. The comparatively high non-farm income in case of small farmers can be attributed to remittances received from the family members settled abroad.

As stated earlier that vegetable growers from small land holding category have apportioned comparatively more area to vegetable cultivation.

In Table 7 the farm income with respect to different land holding categories has been presented on per acre of net sown area (NSA) and gross cropped area (GCA) basis so as to make sure that the extent of inclusion of vegetable crops into the cropping pattern reflects itself.

The quick glance at the Table 7 highlights that farm income per acre of GCA has been observed to be Rs. 20305 per annum in case of small farmers, which happens to be significantly higher than that secured by medium (Rs. 15748) and large (Rs. 14863) farmers. The proportionately higher acreage under vegetables in case of small farmers can be the plausible reason for higher returns.

As regards the farm income per acre of NSA, it has been recorded as Rs. 57771 per annum for small farmers, which is significantly higher ( $p < 0.01$ ) than that observed in the case of medium (Rs. 35607 per annum) and large (Rs. 33945 per annum) farmers. This can well be attributed to higher cropping intensity (281 %) in case of small farmers as compared to that in case of me-

dium (227 %) and large (230 %) farmers. In fact, the inclusion of vegetables in the cropping pattern has increased the cropping intensity as vegetables are short duration crops. Chahal and Kataria (2009) affirmed that vegetables give higher returns as compare to wheat and paddy and even have higher tonnage per unit of land per unit of time.

The small farmers manifested greater inter farmer variability (indicated by higher coefficient of variation figures) in farm income, may it be on per acre of NSA or GCA basis as compared to their counterparts with larger farms. The greater variability in case of small farmers can be attributed to the differentials in the vegetable crop.

#### Contribution of Vegetables to Farm Income

The annual farm income of the vegetable growers of different land holding categories split up into income from vegetable crops and other crops has been presented in Table 8. It is evident that the share of vegetable crops in total farm income happens to be the highest (78.3 %) in case of small farmers. The respective percentage has been estimated at 60.1 percent for medium and 47.3 percent for large farm holders. As regards the income from vegetable farming in absolute terms, the large farmers got the highest (Rs. 2.84 lakh), medium farmers the second highest (Rs. 1.79 lakh) and the small farmers, the lowest (Rs. 1.1 lakh). In statistical terms, the small and medium farmers happened to be at par

**Table 7: Farm income vis-à-vis size of land holding on area basis Rupees year<sup>-1</sup>**

Farm income	Small	Medium	Large	Overall
Per Acre of NSA	57771 <sup>a</sup> (45.4)	35607 <sup>b</sup> (32.5)	33945 <sup>b</sup> (24.4)	42441 (47.5)
Per Acre of GCA	20305 <sup>a</sup> (41.9)	15748 <sup>b</sup> (30.0)	14863 <sup>b</sup> (25.4)	16972 (37.7)

Figures in parentheses indicate the co-efficient of variation %

<sup>a,b</sup> figures with different superscripts in a row differ significantly ( $p < 0.05$ )

**Table 8: Contribution of vegetables to farm income Rs. year<sup>-1</sup>**

Source	Small	Medium	Large	Overall
Vegetable	110163 <sup>b</sup> (78.3)	179152 <sup>b</sup> (60.1)	283721 <sup>a</sup> (47.3)	191012 (55.2)
Other crops	30519 <sup>c</sup> (21.7)	118850 <sup>b</sup> (39.9)	315973 <sup>a</sup> (52.7)	155114 (44.8)
Farm income	140682	298002	599694	346126

Figures in parentheses indicate percentages

<sup>a,b,c</sup> figures with different superscripts in a row differ significantly ( $p < 0.05$ )

( $p < 0.05$ ) and worse off in comparison to large farmers, as far as the income from vegetable farming is concerned. The larger proportion (78.3 %) of income from vegetable farming in total farm income in case of small farmers is commensurate with the large share of vegetable crops in GCA. Joshi et al. (2006) also revealed that vegetable production was more profitable befitting precisely in small farm production system. Even Baishya et al. (2009) in their study highlighted that 83 percent of the respondent farmers were having either marginal or small holding size and the inclusion of vegetable crops in the system provided them better returns.

### CONCLUSION

Small category farmers had more area under vegetables as percent of operational area fetching them good profits as compared to vegetable growers having large land holdings. A non-significant difference was observed for different vegetables with respect to variable cost and net returns. The three categories of farmers differed significantly ( $p < 0.01$ ) with respect to their income while the farm income per acre of Gross cropped area and Net sown area per annum was significantly higher of small farmers as they earn better from vegetable crops instead of other crops and take more crops per year mostly the vegetables.

The small farmers had larger proportion of income from vegetables. The potato crop cornered the highest share in gross vegetable acre-

age, followed by cauliflower, pea, carrot, okra and tomato. Brinjal and bitter gourd had negligible share in vegetable acreage.

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