

Possibilities of Crop Diversification from Paddy to Vegetables in Haryana: A Case Study of Sonipat District

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Abstract

Haryana state is considered foremost in terms of agricultural growth rate, productivity level and gains from green revolution technology. Problems resulting from green revolution technology like over-exploitation of ground water, soil degradation, weed infestation, mono-cropping, production approaching plateau and stagnation of farm income have also emerged strongly in the state. Therefore the study aims to analyze the relative economics of paddy vis-à-vis vegetable crops by using benefit-cost ratio (BCR) and to examine the reasons for diversification towards vegetables in Sonipat district of Haryana. The result of the study shows that the cost of cultivation was found lowest for paddy growers but vegetables generate higher returns as compared to paddy. It was also found that the timely payment, less dependence on mechanical inputs, marketing facilities and chance of seasonal advantage were the important reasons for attraction towards vegetables among majority of different categories of farmers.

Key- words: *Green revolution, Mono-cropping, Vegetables, Benefit-cost ratio.*

Introduction:

Haryana is one of the foremost states in agriculture sector. Wheat and paddy are the major crops of this state. Small and marginal farmers are in dominance in the state. The size of farm holding reported a rapid retardation because of population burst and splitting of joint families into nuclear families. So, the farm holding size in the state has been declining. The average size of land holding in Haryana is 2.25 hectares (Statistical Abstract of Haryana, 2014-15). Because of these small operational holdings, it will not be possible to enhance the income of the farmers only by increasing the productivity of the existing crops. Agriculture in Haryana stands at a crucial stage where some actions have to be taken to lift it. Intensive agriculture is mortifying the natural resources in the state. The availability of water is decreasing.

Unsystematic use of irrigation and scarcity of drainage has raised the water table. Due to selective cropping pattern biodiversity gets affected. Indiscriminate use of chemical fertilizers has created a lot of problems. Many species of birds have vanished. Because of excessive use of pesticides water and soil have been contaminated. In short, both the food and the nutritional values are threatened. This also generates a number of other problems like seasonal unemployment and under-employment are increasing in the agriculture sector of the state. The intensive cultivation is also not able to overcome this employment situation of the state. The intensity of labour in the agriculture sector by the dominated field crops is low. Crop diversification may eradicate these unemployment problems as horticulture and livestock products can absorb more labour than the traditional crops. The findings of the study of Chand (1999) also proves this fact that in Punjab, labour absorption was 307 hour per acre in the production of potatoes and 225 hours in case of other vegetable crops; while for traditional crops like wheat, barley and mustard cultivation was only 127 hours. He also suggests that if the area under wheat and paddy (the traditional crops) is substituted by other high-value crops, and dairy farming is raised on the same area, it will absorb more labour i.e. around 7.3 times more than the wheat-paddy cultivation. Apart from direct employment, diversification also helps in providing scope for indirect generation of employment through boosting agro-processing industries.

As the traditional crop farming is having high degree of uncertainty and risk as it provides only seasonal, irregular and uncertain income to the farmer. So, it is difficult for the farmers with small number of resources to sustain themselves and their family and also to make investment in the farm.

Diversification is also needed for the reclamation of the degraded natural resources. Several times, cropping pattern has been diversified and the new cropping patterns have been introduced to preserve or to improve the value of natural resources, specially land and water. Moreover, dominance of the wheat- paddy cropping system has led to serious social and economical problems such as decrease in growth rate of productivity, fall in agricultural self-employment, over exploitation of groundwater resources and decline in soil fertility (Chand, 1999). As, water is a scarce resource and growing of high water intensive crops like wheat and paddy over years create consequences like depletion of water table, salinity, weed infestation, multiplication of insect-pests and diseases, deterioration in soil health, intensive use of commercial energy etc. The imbalanced use of resources and prevailing cropping

pattern has resulted into stagnation in the productivity, ecological imbalance and degradation of soil accompanied by other related problems like market price induced instability of income and input supply.

So, the crop diversification emerges as an important strategy for increasing the income of the farmers with stabilization and generation of gainful employment opportunities to the rural households.

Objectives:

Following objectives of the study have been framed to get fruitful results.

1. To analyze the relative economics of paddy vis-à-vis vegetable crops.
2. To examine the reasons for diversification towards vegetables in Sonipat district of Haryana.

Data Analysis and Research Methodology:

This study is based on the cross-sectional data. A multistage simple random sampling method has been used for this purpose. At the first stage, Sonipat district has been selected by using purposive sampling as the district is the largest producer of vegetables in Haryana. At the second stage, two blocks Ganaur and Murthal has been selected again by using purposive sampling. At the third stage, four villages have been selected out of the selected blocks, two from each by using random sampling and at the last stage; farmers have been conferred for interview. A list of those farmers has been prepared by personal investigation; who have diversified their crop from the selected four villages. And out of this list a sample of 40 farmers i.e. 10 from each category of farmers has been selected randomly from a village and interviewed. In this way a total of 160 farmers have been interviewed for the study.

Farmers in selected villages have been categorized in four categories on the basis of the area of land holdings viz.

Marginal Farmers- (0-2 acre)

Small Farmers - (2-5 acre)

Medium Farmers - (5-8 acre)

Large Farmers - (8- and above acre)

For the purpose of collection of data, a scheduled questionnaire was structured for the farmers. The questions cover the information about the cost and returns of paddy and

vegetable crops. All the questionnaires were filled by direct interview and personal visits to farmers.

Cost and Return Analysis:

For comparing the cost and benefits of paddy and vegetable crops, benefit cost ratio analysis has been used in the study.

The cost of cultivation has been worked out by following variable cost components classification and standard cost concepts. The production cost includes following variable costs.

$$C_P = C_L + C_I + C_S + C_{LA} + C_M + C_F + C_P + C_O$$

Where s

C_P = Total production cost

C_L = Land preparation cost

C_I = Cost of irrigation

C_S = Cost of seeds

C_{LA} = Labour cost

C_M = Cost of machine and other tools

C_F = Fertilizers cost

C_P = Pesticides cost

C_O = Other costs of input (transportation and marketing)

The gross returns have been calculated by multiplying total production with average price.

The net returns over production cost have been calculated as the difference between gross return and production cost.

Benefit cost ratio:

To assess the economies of crops / farming system benefit cost ratio analysis is an important tool. It is the ratio of benefit with the cost. As the ratio indicate the rate of gross returns from the use of an input (Grover et al, 2015).

$$BCR = \text{Gross returns} / \text{Total production cost}$$

Result and Discussion:

Firstly, the cost of cultivation of paddy and selected vegetables and the profitability of vegetable crops as compare to competing crop paddy has been analyzed. After that the

reasons for diversification towards vegetables as reported by the sampled farmers has been examined.

1. Cost of Cultivation of Paddy vis-à-vis Vegetables:

Table-1 shows the different cost variables. Basically the production cost of first stage i.e. cost of cultivation has been divided into eight parts i.e. land preparation cost, cost of irrigation, cost of seeds, labour cost, cost of machine and other tools, fertilizers cost, pesticides cost and other costs of input (transportation and marketing).

Table-1
Cost of Cultivation of Paddy and Vegetables, Sampled Households in 2015-16
(Rs. Per acre)

Sr. no	Input cost	Paddy	Cauliflower	Brinjal	Tourai	Tomato
1	Land preparation cost	3299 (15.48)	3850 (6.70)	3778 (8.74)	3820 (8.70)	3800 (5.11)
2	Cost of irrigation	3787 (17.76)	2475 (4.31)	2265 (5.24)	2460 (5.60)	1470 (1.98)
3	Cost of seeds	1709 (8.02)	4100 (7.14)	670 (1.55)	1450 (3.30)	4987 (6.71)
4	Labour cost	4061 (19.05)	6800 (11.84)	9075 (20.98)	15400 (35.06)	19550 (26.30)
5	Cost of machine and other tools	1488 (6.98)	-	-	-	-
6	Fertilizers cost	2488 (11.67)	8460 (14.73)	5200 (12.02)	3890 (8.86)	6270 (8.43)
7	Pesticides cost	3255 (15.27)	24800 (43.19)	12800 (29.60)	8700 (19.81)	9760 (13.12)
8	Other costs of input (transportation and marketing)	1231 (5.77)	6940 (12.09)	9460 (21.86)	8200 (18.67)	28500 (38.34)
9	Total cost	21318 (100)	57425 (100)	43248 (100)	43920 (100)	74337 (100)

Source: Calculations based on primary survey

As paddy is a water intensive crop. So 17.76 per cent of total cost was spent on irrigation i.e. Rs. 3787 per acre for all farmers and the highest share of cost was found for labour in case of paddy cultivation i.e. 19.05 per cent of total cost. In case of cauliflower and brinjal share of pesticides cost was higher i.e. 43.19 and 21.86 per cent of total cost respectively. Tourai borne higher percentage share of labour cost in total cost as compare to other vegetables and paddy while in case of tomato transportation and marketing cost was found highest.

2. Profitability of vegetable crops with competing crop paddy:

The results of the collected data about the costs and returns of vegetables and competing crop paddy during the kharif season have been presented in table-2. The major competing vegetable crops of paddy in the study area were cauliflower, brinjal, tourai, and tomato. The cropping pattern followed by the sampled farmers under different size group of holdings was more or less same. There was a little bit deviation among the sampled farmers.

The average yield of paddy was 21.70 qtls per acre at the aggregate level and the farmers reaped an average price of Rs. 1840 per qtl for the year 2015-16. The sampled farmers earned a total of Rs. 20427 per acre over cost from the cultivation of paddy during the year.

Table-2
Comparative Profitability of Paddy and Vegetables, Sampled Households in 2015-16

Name of the Crop	Average Yield(qtl/acre)	Average Price(Rs./qtl)	Gross Returns	Total Cost	Returns over cost	Benefit Cost Ratio
Paddy	21.70	1840	39928	19501	20427	2.04
Cauliflower	148.5	1230	182655	57425	125230	3.18
Brinjal	159	842	133878	43248	90630	3.10
Tourai	137	684	93708	43920	40580	2.13
Tomato	340	720	244800	74337	170463	3.29

Source: Calculations based on primary survey

It has been seen clearly from the above table that per acre cost of vegetable cultivation for all sampled farmers was much higher in comparison to that of paddy but the benefit cost analysis indicates that the investment in paddy as well as in vegetables is economically viable as benefit cost ratio of paddy and vegetables explains that on an average Rs. 1 investment brings more than Rs. 1 returns for the farmers. The benefit cost ratio was highest for tomato (3.29) followed by cauliflower (3.18), brinjal (3.10), and tourai (2.13) but it was lowest for paddy (2.04) for all the sampled farmers. Paddy has lowest cost as compared to vegetables but vegetables generate higher benefits as compared to paddy. So from economic point of view vegetables are more economically viable as compared to paddy.

3. Reasons for the attraction towards vegetable crops:

There could be various reasons responsible for growing or not growing a particular crop. Such reasons influence farmers' decision to cultivate a crop. There are many reasons as

revealed by sampled farmers' for attraction towards vegetables namely timely payment, chance of seasonal advantage, suitable climatic condition, marketing facilities, to maintain fertility of soil, irrigation, less dependence on mechanical inputs and others have been presented in tables 3 to 6.

Table-3
Reasons Expressed by Marginal Farmers for Attraction towards Vegetables in 2015-16
(Per cent multiple response)

Sr. no	Particulars	Rank 8	Rank 7	Rank 6	Rank 5	Rank 4	Rank 3	Rank 2	Rank 1
1	Timely payment	80	8	4	8	0	0	0	0
2	Chance of seasonal advantage	8	76	16	0	0	0	0	0
3	Suitable climatic conditions	0	0	0	8	16	76	0	0
4	Marketing facilities	0	0	0	0	0	4	12	84
5	To maintain fertility of soil	0	0	0	8	76	16	0	0
6	Irrigation	4	8	80	8	0	0	0	0
7	Less dependence on mechanical inputs	8	8	0	68	8	4	0	4
8	Others	0	0	0	0	0	0	88	12

Note: Ranks are in order of importance from 8 (most important) to 1 (least important)

Source: Calculations based on primary survey

Table-3 has explained the different reasons for attraction towards vegetables as expressed by marginal farmers. It has been observed during the survey that there are many reasons that have been expressed by the farmers. A rank method has been used to explain the farmers' response according to their experience with the above said reasons. Ranks are in order of importance from 8 (most important) to 1 (least important). The percentage of sampled farmers is here as:

The table shows that majority of marginal farmers considers timely payment as the most important reason for attraction towards vegetables as 80 per cent farmers gave rank 8 to timely payment. On the other hand chance of seasonal advantage has been considered as the second most important reason by majority of marginal farmers as 76 per cent farmers gave rank 7 to this reason. Suitable climatic conditions is not very significant reason among maximum of marginal farmers as 76 per cent marginal farmers gave rank 3 to this reason i.e., on the lower side of the ranking scale. Marketing facilities is considered as the least important

reason for attraction towards vegetables among marginal category farmers as 84 per cent farmers gave rank 1 to this reason. 76 per cent of sampled marginal farmers gave rank 4 to maintain fertility of soil as it is considered a normal reason among majority of farmers.

Further, rank 6 and rank 5 have been given by 80 and 68 per cent farmers respectively to irrigation and less dependence on mechanical inputs respectively. Other reasons are least important as 88 per cent marginal farmers gave rank 2 to this reason.

Table-4
Reasons Expressed by Small Farmers for Attraction towards Vegetables in 2015-16
(Per cent multiple response)

Sr. no	Particulars	Rank 8	Rank 7	Rank 6	Rank 5	Rank 4	Rank 3	Rank 2	Rank 1
1	Timely payment	12	0	88	0	0	0	0	0
2	Chance of seasonal advantage	84	8	4	4	0	0	0	0
3	Suitable climatic conditions	0	0	0	12	84	0	4	0
4	Marketing facilities	0	0	0	0	4	16	76	4
5	To maintain fertility of soil	0	0	0	0	8	76	8	8
6	Irrigation	0	0	4	84	4	0	8	0
7	Less dependence on mechanical inputs	4	92	4	0	0	0	0	0
8	Others	0	0	0	0	0	8	4	88

Note: Ranks are in order of importance from 8 (most important) to 1 (least important)

Source: Calculations based on primary survey

Table-4 highlighted the reasons for attraction towards vegetables as expressed by small size farmers. The table shows that 88 per cent of sampled small farmers gave rank 6 to timely payments but rank 8 has been given by remaining 12 per cent of sampled farmers as the reason for them is most important. On the other hand, chance of seasonal advantage is on the higher side as compared to timely payment as 84 per cent farmers gave it rank 8 and considered as the most important reason by the sampled small size farmers. Suitable climatic conditions is not very significant reason among maximum of small size farmers as 84 per cent small farmers gave rank 4 to this reason i.e. on the lower side of the ranking scale.

Further, marketing facilities and to maintain fertility of soil are also on the lower side of the ranking scale as majority of farmers gave rank 2 and 3 to the above said reasons respectively. Rank 5 has been given to irrigation by 84 per cent of small farmers as it is considered a

normal reason by majority of small size farmers. Rank 2 has been given by 92 per cent of small size farmers to the less dependence on the mechanical inputs as it is considered one of the most important reasons for attraction towards vegetables while rank 1 has been given to other reasons considered as a least important reason by small category farmers.

Table-5
Reasons Expressed by Medium Farmers for Attraction towards Vegetables in 2015-16
(Per cent multiple response)

Sr. no	Particulars	Rank 8	Rank 7	Rank 6	Rank 5	Rank 4	Rank 3	Rank 2	Rank 1
1	Timely payment	4	4	88	0	4	0	0	0
2	Chance of seasonal advantage	12	72	8	4	4	0	0	0
3	Suitable climatic conditions	0	4	0	0	4	4	84	4
4	Marketing facilities	80	8	4	4	4	0	0	0
5	To maintain fertility of soil	0	8	0	84	4	0	4	0
6	Irrigation	0	4	0	8	80	0	8	0
7	Less dependence on mechanical inputs	4	0	0	0	0	92	4	0
8	Others	0	0	0	0	0	4	0	96

Note: Ranks are in order of importance from 8 (most important) to 1 (least important)

Source: Calculations based on primary survey

Table-5 explained the different reasons for attraction towards vegetables as expressed by medium category farmers. The table shows that 88 per cent of sampled medium size farmers gave rank 6 to timely payments. On the other hand, chance of seasonal advantage is on the higher side as compared to timely payment as 72 per cent farmers gave it rank 7 and considered as one of the most important reason by the sampled medium size farmers. Suitable climatic conditions are on the lower side of the ranking scale as 84 per cent medium category farmers gave it rank 2 and considered as one of the least important reason among all. Marketing facilitates are considered as the most important reason for attraction towards vegetables as 80 per cent farmers gave rank 8 to this reason. Rank 5 and 4 has been given to maintain fertility of soil and irrigation respectively by majority of farmers. So these are considered as the normal reasons as these lie in the mid of rating scale.

Further, 92 per cent farmers gave rank 3 to less dependence on mechanical inputs which is not a significant reason among sampled medium size farmers while other reasons are least important as 96 per cent farmers gave rank 1 to the reason.

Table-6
Reasons Expressed by Large Farmers for Attraction towards Vegetables in 2015-16
(Per cent multiple response)

Sr. no	Particulars	Rank 8	Rank 7	Rank 6	Rank 5	Rank 4	Rank 3	Rank 2	Rank 1
1	Timely payment	12	4	84	0	0	0	0	0
2	Chance of seasonal advantage	8	88	4	0	0	0	0	0
3	Suitable climatic conditions	0	0	0	8	0	92	0	0
4	Marketing facilities	80	8	8	4	0	0	0	0
5	To maintain fertility of soil	0	0	0	8	84	4	0	4
6	Irrigation	0	0	4	68	12	4	4	8
7	Less dependence on mechanical inputs	0	0	0	0	4	0	20	76
8	Others	0	0	0	12	0	0	76	12

Note: Ranks are in order of importance from 8 (most important) to 1 (least important)

Source: Calculations based on primary survey

Table-6 has highlighted the reasons for attraction towards vegetables as expressed by large category farmers. The table shows that 84 per cent of sampled large size farmers gave rank 6 to timely payments. On the other hand, chance of seasonal advantage is on the higher side as compared to timely payment as 88 per cent farmers gave it rank 7 and is considered as the second most important reason by the sampled large size farmers. Suitable climatic conditions are on the lower side of the ranking scale as 92 per cent of sampled large size farmers gave it rank 3. Marketing facilitates is considered as the most important reason for attraction towards vegetables as 80 per cent farmers gave rank 8 to this reason. Ranks 4 and 5 have been given to maintain fertility of soil and irrigation by majority of farmers. So these are considered as the normal reasons as the reasons lies in the mid of rating scale.

Further, 76 per cent farmers gave rank 2 to less dependence on mechanical inputs which is not a significant reason among sampled large size farmers while other reasons are least important as 76 per cent farmers gave rank 1 to the reason.

Conclusion and Policy Implications:

It may be concluded that the cost of cultivation was found lowest for paddy growers but vegetables generate higher returns as compared to paddy. So from economic point of view vegetables are more economically viable in comparison to paddy. It was also found that the timely payment and chance of seasonal advantage were the important reasons for attraction towards vegetables among majority of marginal size farmers; chance of seasonal advantage and less dependence on mechanical inputs were reported as important reasons for attraction towards vegetables among small category farmers while marketing facilities and chance of seasonal advantage were considered as important reasons by majority of medium and large size farmers.

At the end, crop diversification from paddy towards vegetable crops in the kharif season in Haryana requires a favorable price regime, technology for increasing the existing levels of productivity, financial support, infrastructure facilities in rural area and above all, a multi-pronged government support. Without firm policy reforms in favour of vegetable crops, crop diversification will remain an elusive goal in Haryana and will continue as an issue which will be debated in different form without any concrete outcome.

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