

ECONOMIC EXPECTATIONS AND LAND ALLOCATION IN FAVOUR OF HORTICULTURAL CROPS

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Higher allocation of land in favour of fruits and vegetables is vital to raise the farm income and productivity but such opportunity is also complemented with higher risk. Economic decisions assumes great role while such decisions have an impact on the welfare of farmers in terms of their income and risk. In this paper, we examined the nature of price expectations, its relationship with other economic factors and analysed the importance of price vis-a vis income expectations by the farmers on their land allocation decisions. The results show that better price expectation improves the input use (generally labour and capital) propensities. However, for the allocation of the inelastic factor of production, i.e., land, in favour of horticultural crops, it is the income expectation that explains a farmer's decision Farmers' capacity to generate higher productivity along with the better market prospects together explains their decision regarding allocating land to high as against low value crops.

Keywords : Land Allocation, Horticulture Crops.

INTRODUCTION

In agriculture, farmers make decision in an environment where the outcomes of the decisions are not known with certainty. The economic variables, which link successive time periods are expectations or attitudes of farmers and their entrepreneurial decision and acts (mainly land allocation among low and high value crops) that are motivated by them (Williams, 1952). The motivation for higher allocation of land in favour of high value crops is their potential of generating high income, productivity and employment. However, though, both fruits and vegetables are highly remunerative crops, these crops are also considered as risky crops. The major feature of the horticultural crops is that the prices of the crops fluctuates too much and that too within a single season. Lack of any support price and high perishability of the crops make the horticultural growers even more vulnerable to risk and uncertainty as compared to growers of other high value crops like rice or sugarcane. In the event of greater extent of risk and uncertainty, expectations assume a greater role in the resource allocation decisions including land. Farmer's build these expectations on the basis of changes in the price and production potential of the crop and accordingly invest resources or allocate resources among crops and activities.

There are several ways in which the information regarding the expectation is obtained at the micro or farm level. Such information pertains to the probability (objective and subjective) and possibility of different prices, incomes or events at the farm level. The specific questions include the prices which farmers consider as most profitable, possibility of different range of prices, probability of occurrences of different levels of prices, and the prices that surprise farmers, etc (Shackle, 1949; Williams, 1952; Binswanger, 1981 and Hardarkar, 2000). In this study, we shall obtain the expectations of price by the farmers on the basis of their experiences with different levels of prices- maximum, minimum and average, and thereafter link the expectations with their

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resource allocation decisions including land, labour and capital. In this regard, we shall examine the nature of price expectations of the selected farmers, on the basis of their experiences with different levels of prices and explore the relationship of price expectations with other economic factors such as crop yield and cost of production.

While making production or land allocation decisions, though farmers are uncertain about the future outcomes, they are generally aware of the band of both the price and production (the combination of minimum, maximum and average) that together affects the possibility of the revenue band of the farmer. Farmers with higher food consumption requirements at home (due to huge family size) and low resource or income group farmers (higher number of dependants etc.) generally are more affected by the width of such revenue bands that is determined by the combination of both price and production. Not only the farm characteristics but also the failure of labour and food market (that affects revenue stream) together exerts a strong influence on the land allocation decisions (Janvry et al, 1991). Thus, price alone may not be the only factor in decision making due to heterogeneity in the resource and capital endowments of the farmers and because of different access to input and output market by the farmers. It could be hypothesized that farmers with relatively higher level of production allocate more land even at low expected price. Due to the existence of several transaction costs and difference in productivity, income also differs across regions and across farmers within the same region that also influence farmers' decision while allocating area among the crops. Hence, it is also important to analyse the link between income expectations in the land allocation decisions of the farmers. We explore whether price expectation really matters for land allocation decisions and what is the better variable i.e., price, or income expectations by the farmers on their land allocation decisions.

SAMPLE

This study is carried out in the Shimla district of Himachal Pradesh (the Horticultural State of India), where horticultural crops contributes more than 30% of the total value of output in the agricultural sector. A multi-stage purposive sampling procedure was followed in order to select the block, villages and farmers. The selection of block is done on the basis of allocation of land in favour of horticultural crops i.e., fruits and vegetables. Theog block emerges out to be the representative block on the basis of highest allocation towards horticultural crops. For villages, the sample was drawn from four villages (two villages each for fruits and vegetables) from this block, as these villages are representatives in land allocation in favour of fruits and vegetables respectively¹. Sample of 30 farm households (120 farmers in total) was drawn from each of the four villages following a stratified and proportional random sample approach² on the basis of farm size distribution. Apple (as fruit) and cauliflower (as vegetable) crops are chosen for the study on the basis of their highest allocation of land towards these crops in the respective villages.

TPOLOGY OF LAND ALLOCATION

The typology of land allocation in favour of horticultural crops is measured by the level of land allocation towards the selected crops (apple and cauliflower). The indicator of land allocation in favour of these crops is the proportionate area under the selected crops in the total net cropped area. The results of the extent of land allocation towards apple and cauliflower in the villages show that these crops are of high significance for the farmers in terms of their livelihood. The crops cover more than 50% of their net cropped area in all the villages and they contribute about 60 %

and 70% of the total firm income of the cauliflower and apple growers', respectively (table 1). Apple crop dominates in terms of both high proportion in area and income of the crop as compared to cauliflower. The results of typology of land allocation across different farm sizes illustrate that in case of cauliflower, it is the large farmers who dominate the extent of land allocation towards the crop. However, this is followed by the category of marginal farmers (table 2). This shows that marginal farmers have also been able to allocate a considerable amount of area for this crop. In case of apple, it is the small and marginal farmers, who dominate the highest allocation of land in favour of the crop. It is important to mention that small and marginal farmers possess less area as compared to farmers of other groups and their decision of allocating more area to a high value crop can be either an accumulative or survival strategy (Chaplin, 2000). In many cases, small and marginal farmers allocate large area to high value but risky crops in order to fight against poverty. This reflects the gambling attitudes of the farmers. Hence, on the face value, high allocation towards high value crops should not be viewed as a high growth strategy without verifying additional information about the effect of land allocation decisions on farmers' welfare in terms of its effect on income and risk patterns of the farmers.

Table 1, Extent of Land Allocation in Favour of Horticultural Crops

Variable	Indicator	Cauliflower			Apple			Aggr- egate
		Village 1	Village 2	Total	Village 3	Village 4	Total	
Proportion of Selected crop area to Net Cropped Area	($a_i/\Sigma A$)	54.21	49.95	46.47	67.18	70.05	68.85	54.25
Proportion of Selected crop value to total farm value produced in a year	($v_i/\Sigma V$)	65.12	74.41	68.45	71.63	81.66	73.08	70.39

($a_i/\Sigma A$)= proportion of area (a) under particular crop (i) in the Net Cropped Area (A)

($v_i/\Sigma V$)= proportionate value (v) of a particular crop (i) in the total value of the farm output (V)

Village 1,2,3,4 are Govai, Sainj, Sandhu and Shilaru respectively

Source : Primary Data

¹ The choice of village was based on the discussion with the agricultural and horticultural development officers of Theog block.

² Since, interview with farmers also include recall method, many farmers were found to have given inadequate information. Hence, re-sampling was done after the completion of farmers from the first list of 120. The model of stratified and proportional random sample approach was kept intact while re-sampling was designed. In total, 167 farmers were interviewed to cover the complete information from 120 farmers.

Table 2, Extent of Land Allocation Across Farm Size

Farm Size	Proportion of area under Apple or Cauliflower to Net Cropped Area (ha) ($a_i/\Sigma A$)
(a) Cauliflower	
Marginal	58.33
Small	52.67
Semi-medium	51.78
Medium	35.20
Large	62.61
(b) Apple	
Marginal	71.62
Small	72.98
Semi-medium	69.06
Medium	51.86
Large	66.90

Source: Primary Data

SOCIO ECONOMIC FACTORS AND LAND ALLOCATION

Socio-economic factors can exert significant influence on the extent of land allocation towards horticultural crops through their influence on resource availability and on risk management abilities at farm level. The results reveal that both the family size and the number of dependents decreases as the level of land allocation in favour of high value crop increases for both fruit and vegetable crops (table 3). This shows that more number of dependants and higher food requirements at home acts as a constraint in increasing allocation to high value crops. The land allocation in favour of horticultural crops is also higher among the farmers with low farm size. In terms of irrigation, which is important for the vegetable crop (for its production and profitability), there is a positive correlation between level of allocation and irrigation intensity. But the same is not the case with apple, which does not require irrigation for production purpose. Higher ratio of land to labour indicates the availability of labour at home and affects the decision of land allocation towards horticultural crop. In both the cases of apple and cauliflower, we found a negative correlation between the level of land allocation to high value crop (apple/cauliflower) and land to labour ratio. This indicates that more labour at home, for which the farmers are not supposed to incur any additional cost, affects the land allocation decision. Reluctance to hire more farmers and disinclination to bear more input costs results in lower level of land allocation towards high value crops.

Table 3, Socio-Economic Characteristics at Different Level of Land Allocation

Proportion of selected crop area to total Net Cropped		Family size (No.)	No. of dependants (No.)	Farm size (ha)	Irrigation intensity*	Land/Labour	Annual Non-farm income (Rs.)
Cauliflower	Low (<0.33)	7.83	2.92	4.56	55.07	0.44	101955
	Medium (0.33-0.66)	6.17	2.03	2.72	63.60	0.33	87331
	High (>0.66)	6.92	2.50	1.93	88.13	0.23	50439
Apple	Low (<0.33)	7.57	2.86	6.05	14.92	0.77	181403
	Medium (0.33-0.66)	7.33	2.25	4.23	18.55	0.50	171584
	High (>0.66)	5.78	1.51	4.67	7.80	0.69	93958

* Percentage of Net Irrigated Area to Net Cropped Area

Source : Primary Data

DYNAMICS OF PRICE EXPECTATIONS AT FARM LEVEL

For the purpose of examining the role of price and income expectation on land allocation decisions, we obtained the information from the farmers about their personal experience of the minimum and maximum price and production of the selected crop (cauliflower and apple) in the last ten years. We then asked about the most expected price and production of the crop that they think is the one they generally get and is usually the one which enters into their criteria of decision making. In addition, the data on the area, price and production in the last three years is also obtained from the farmers. The input-wise cost data is collected to find various types of costs incurred by the farmers (fixed, variable, paid-out, production, marketing cost etc.).

The data on price expectations of the farmers growing cauliflowers revealed that majority of the farmers' expected price is Rs. 10 though the range of the band varies from Rs.6 to Rs.15 (table 4). It is also found that the expected price of twenty two farmers (out of sixty farmers) is below the mean of the expected price, whereas there are only eleven farmers whose price expectation is greater than Rs. 10. The range of minimum price varies from Rs.2 to Rs 9.5. Unlike expected price, here most of the farmers' minimum price is greater than its mean value. In the case of maximum price, the mean price is Rs. 14.25 but majority of the farmers (thirty eight) are unable to reach the mean of the maximum price. This shows that only few farmers have been able to get higher or favourable price for their produce. In case of apple, the mean of the expected, minimum and maximum price is Rs 17.50, Rs 10.20 and Rs 25.60 respectively (table 5). Though in the case of expected price, almost half of the farmers are on either side of the mean price, for the maximum price, again majority of the farmers are unable to reach its mean value. But, unlike the case of cauliflower, large number of farmers receive a price that is below the mean of the minimum price of apple. This means that majority of the farmers growing apples also experienced very low minimum or unfavourable prices. It is important to note that the maximum price of apple is far higher than that of the vegetable prices. In both the cases of cauliflower and apple, only a few farmers have been able to reach the high ebb of the maximum price of the crop, pointing to the variance in the benefits of the market price accrued by the farmers.

Table 4, Farmers Experience with Price of Cauliflower (Rs./kg) and their Price Expectations

Price Scenarios	Expected Price	Frequency*	Minimum Price	Frequency	Maximum Price	Frequency
	6	1	2	4	10	1
	7.5	5	2.5	3	11	4
	8	2	3	5	11.5	2
	9	12	3.5	2	12	2
	9.5	2	4	2	12.5	23
	10	27	5	5	13	3
	11	1	5.5	3	14	3
	11.5	3	6	7	15	6
	12	1	6.25	4	16.5	1
	12.5	3	6.5	12	17.5	9
	13	1	6.75	1	20	5
	14	1	7	5	21	1
	15	1	7.5	1		
			8.5	2		
			9	2		
			9.5	2		
Mean	9.89		5.58		14.25	
Mode	10.0		6.5		12.5	

* In total there are 60 farmers

Source: Primary Data

Table 5, Farmers Experience with Price of Apple (Rs./kg) and their Price Expectations

Price Scenarios	Expected Price	Frequency*	Minimum Price	Frequency	Maximum Price	Frequency
	8	1	2	1	20	5
	11	1	4	1	21	1
	12	1	5	2	22	9
	13	1	6	9	24	18
	14	3	7	1	26	6
	15	6	8	7	28	9
	16	15	9	1	30	5
	17	3	10	16	32	5
	18	8	12	8	36	2
	19	4	14	5		
	20	12	15	2		
	22	1	16	6		
	23	1	18	1		
	24	2				
	25	1				
Mean	17.41		10.2		25.6	
Mode	16		10		24	

* In total there are 60 farmers

Source: Primary Data

By using the data on prices experienced by the farmers in the last three years (2004, 2005 and 2006) and expected prices by the farmers, we calculated the deviation between the expected and mean price experienced by them (table 6). Interestingly, we found that in both the cases of apple and cauliflower, majority of the farmers have experienced a price above their expected price. There is only one farmer in each category who has the expected price equal to the mean price (mean of price in 2004, 2005 and 2006) and there are less number of farmers whose expected prices is greater than the mean price experienced in the last three years. This shows that there is a greater time-lag (and not three year time period) in the prices experienced by the farmers in shaping their price expectations of the crop.

PRODUCTIVITY, INCOME AND COSTS ACROSS DIFFERENT PRICE EXPECTATIONS

According to the economic theory, price expectation is expected to exert a strong influence on the behaviour of the farmer regarding resource allocation including inputs like land, labour and capital. Generally, farmers who expect better price generally involve in more resource intensiveness as compared to others. Here, we examine the influence of price expectations on the cost and income of the farmers.

The results reveal that the price expectation by the farmers is greatly influenced by the range of prices experienced by them (table 7 and 8). The farmers, falling in the group, in which the expected price is higher than the mean expected price, have experienced a higher price as compared to farmers of other groups. The average of maximum price experienced by this group is Rs 17.50 and Rs. 28.47 for cauliflower and apple respectively, whereas the maximum price received by the farmers with low price expectation (below mean) is Rs.13.17 and Rs. 24.46 for cauliflower and apple, respectively. The farmers with higher price expectation also did not experience very low price of the crop, which is Rs. 10.65 and Rs. 5.36 as compared to Rs. 8.75 and Rs. 5.01 for apple and cauliflower, respectively for farmers with low price expectation. Interestingly, the farmers with higher price expectation are found to be also having lesser yield expectation in case of cauliflower but not in the case of apple. This presents a contrast in the decision-making of farmers regarding fruits and vegetable crop. The decision to plant apple is inflexible, as once the apple is planted, first it takes around 6-7 years of continuous expenditure without any output and it takes several years until one starts getting profit from the crop, which is found to be 12-14 years in case of our sampled farmers. Hence, great care is exercised while making the decision of planting. Interestingly, we found that the experience of high price does influence farmers to play the gamble in order to improve their overall gain and they indeed get benefited by such behaviour. The mean

Table 6, Deviation between Mean and Expected Price by Farmers

	Number of Farmers
(a) Cauliflower	
Expected price less than actual price	44
Expected price equal to actual price	1
Expected price greater than actual price	15
(b) Apple	
Expected price less than actual price	49
Expected price equal to actual price	1
Expected price greater than actual price	10

Note : The units are the number of sampled farmers. For each category there are 60 farmers

Source: Primary Data

of the maximum and minimum income of the crop (both cauliflower and apple) over the paid out cost is positive and highest for the group which has high price expectation (price expectations above mean). But this group, as compared to other groups having low price expectations, also incurs huge losses in terms of highly negative income over paid out cost, once they experience together the lowest most price and few production of the crop.

It is likely that the farmers who have better expectations about the price of the crop would incur more expenditure on the inputs like fertilizer, labour hiring, use of chemical spray etc. as compared to other farmers. When we looked into the difference between the total cost of production and paid out cost by the farmers, it is found that for cauliflower, the farmers with higher price expectations, the cost of production per ha of these farmers is lesser as compared to the farmers with low price expectations. However, the paid out cost that includes the cost of fertilizer, irrigation, labour hiring and use of chemical spray etc. by the farmers of this group is highest among the three groups. A lesser total cost of production for this higher price expectation group is probably due to the factors like higher depreciation of farm assets, more value of land etc. Hence, better expectations about the price influences the propensity to involve in more and better use of inputs that has important implications for the policy. It is found that price expectation is higher among the farmers with greater farm size in both the cases of cauliflower and apple. Since, higher expectation of price is also influenced by the level of maximum price received by the farmer, it can be concluded that greater farm size farmers have better advantage in terms of their bargaining power in the market. They could get higher price for their produce as compared to small and marginal farmers. It is important to mention that we do not find much differences in the case of cauliflower and apple growing farmers in terms of their productivity and cost behaviour. However, the results of apple crop cannot be only attributed to expectations and attitudes as difference in the age of plants, that varies considerably across farmers, also affects the productivity and costs incurred by the farmers.

Table 7, Productivity, Income and Costs across Price Expectations of Cauliflower

Price Expectation	Below mean (N=22)	Around mean (N=27)	Above mean (N=11)
Minimum Price (Rs/kg)	5.01	6.14	5.36
Maximum price (Rs/kg)	13.17	13.77	17.50
Difference between maximum and minimum price	8.16	7.63	12.14
Minimum yield (production/ha)	9428	10548	9668
Expected Yield (production/ha)	14650	15689	14256
Maximum yield (production/ha)	21911	22812	21400
Mean of maximum and minimum income	54904	61520	84165
Minimum Income over paid out cost (Rs.)	-20166	-16567	-21005
Expected Income over paid out cost (Rs.)	20182	41553	51244
Maximum Income over paid out cost (Rs.)	129975	139608	187335
Paid out cost (Rs./ha)	73895	85512	80396
Total cost (Rs./ha)	115074	128832	119634
Mean Crop Output (2004-06) (Rs.)	43823	49176	58603
Mean crop Output per ha (2004-06) (Rs.)	16592	17530	16708
Farm Size (ha)	2.90	2.79	3.28

Source : Primary Data

Table 8: Productivity, Income and Costs across Price Expectations of Apple

Price Expectation	Below mean (N=28)	Around mean (N=15)	Above mean (N=17)
Minimum Price (Rs/kg)	8.75	12.4	10.65
Maximum price (Rs/kg)	24.46	24.81	28.47
Difference between maximum and minimum price	15.71	12.41	17.82
Minimum yield (production/plant)	12.92	14.09	16.70
Expected Yield (production/ plant)	37.27	34.36	43.20
Maximum yield (production/ plant)	50.32	55.63	66.19
Mean of maximum and minimum income	122514	115908	252817
Minimum Income over paid out cost (Rs.)	-125143	-47688	-132029
Expected Income over paid out cost (Rs.)	44956	73025	173959
Maximum Income over paid out cost (Rs.)	370172	279505	637665
Paid out cost (Rs./plant)	392	374	483
Total cost (Rs./plant)	480	472	558
Mean Crop Output (2004-06) (Rs.)	268252	178051	345451
Mean crop Output per ha (2004-06) (Rs.)	32.31	32.62	38.80
Farm Size (ha)	5.06	3.72	5.10

Source: Primary Data

EXPECTATIONS AND LAND ALLOCATION TOWARDS HORTICULTURAL CROPS

After exploring the dynamics of price expectation and its relationship with other important economic factors, we analysed the role of price expectation vis-à-vis income expectation on the land allocation decisions of the farmers. Again the results are presented separately for cauliflower and apple (table 9). While referring to both the crops, in general, we have not found any direct link between levels of land allocation with price expectations by the farmers. Though in case of cauliflower, the farmers with higher allocation of land also have relatively higher expectations of price of the crop, but in case of apple, this relationship is rather reverse, i.e., as the land allocation in favour of apple increases, the expectation of price decreases. Better market prospects that is influenced by the prices experienced by the farmers are found to be vital for allocation of resources other than land i.e., labour and capital. But, it is important to note that land is an inelastic factor of production, unlike other resources (labour or capital), and hence it strengthens the case that while allocating land³, farmers either may be more concerned about the income (amalgamation of price

³ In case of apple, the farmers' decision to allocate any particular amount of land to the crop is inflexible in the sense that farmers cannot take the decision to switch to any other crop easily from apple, once land is used for apple cultivation.

⁴ We also obtained the income over the aggregate cost and cost over C2 (as used by farm management study in India), but we preferred using the income over the paid out cost, especially because farmers are more concerned about their remuneration that comes to their hand over the cost incurred directly.

and yield) from the crop or else it is the resource and capital endowments of the farmers that affects such decisions.

When we turn to the case of income expectations, where income is measured as the output per ha over paid out cost⁴ by the farmers, we find a direct link between the extent of land allocation in favour of apple and cauliflower and income expectations. In both the cases, the extent of land allocation increases with the increase in expectations of output per ha. This shows that farmers, generally, calculate the aggregate gain from the crop in their decision than refreshing only to the price of the crop. Their capacity to generate higher productivity along with better market prospects together explains farmers' decision regarding allocating land to high as against low value crops. This explains that, though it is important to build a market structure in order to influence better input-use propensities (generally labour and capital) by the farmers, the same is insufficient for improving farmers' orientation to increase the inelastic factor of production i.e., land in favour of high value crops.

Table 9, Price vis-a vis Income Expectations on Levels of Land Allocation in Favour of Horticultural Crops

Proportion of selected crop area to total Net Cropped Area		Price Expectation (Rs./kg)	Income Expectation (Rs./ha)
Cauliflower	Low	10.04	90854
	Medium	9.67	85416
	High	10.42	96208
Apple	Low	18.14	215714
	Medium	17.33	223562
	High	17.32	284774

Source : Primary Data

CONCLUSION

Higher allocation of land in favour of high value crops like fruits and vegetables are desirable from the point of view of not only to raise the farm income and productivity of the farmers but also to provide growth employment to the farmers in this sector in India. In terms of economic factors, both price and income are the major incentives for the farmers to decide on the allocation of resources that includes both elastic and inelastic factors of production, including land. But not only economic, socio-economic factors in terms of resource and capital endowments also influence the capacity to allocate land to high value crops as these crops require high labour and capital. In this paper, we examined the dynamics of price and income expectation on the land allocation in favour of horticultural crops.

What we found is that in terms of socio-economic factors, more dependants and higher food requirements at home act as a constraint for increasing allocation to high value commercial crops. Interestingly, more labour at home, for which the farmers are not supposed to incur any additional costs, is also vital. Reluctance to hire more farmers and disinclination to bear more input costs hinder higher allocation of land towards high value crops.

The expectation of price varies across farmers and there exists great heterogeneity in terms of

level of price expected (price expectations) by them. Such expected prices are generally lower than the actual price received by the farmers when we compared the mean of last three years' price and the expected price by the farmers. This shows that there is a greater time-lag (and not three year time period) in the prices experienced by the farmers in shaping their price expectations of the crop. Also, the price expectation by the farmers is greatly influenced by the range of prices experienced by them. High prices experienced by the farmers in the market in any given year influence their price expectations. Interestingly, better price expectation improves the input use (generally labour and capital) propensities of the farmers. High price expectations are positively linked with higher per hectare cost of production (paid-out) by the farmers. Also, price expectation is higher among the farmers with higher farm size in both the cases of cauliflower and apple. Since, higher expectation of price is also influenced by the level of maximum price received by the farmer, it can be concluded that greater farm size farmer have a better advantage in terms of their bargaining power in the market. They could get higher price for their produce as compared to small and marginal farmers.

Price expectations are important but they have relatively less role in allocation of the inelastic factor of production, i.e., land towards high value crops. It is income expectations by the farmers that is more critical in improving the land allocation decisions. Farmers, generally, calculate the aggregate gain from the crop in their decision than refereeing only to the price of the crop. Their capacity to generate higher productivity along with better market prospects together explains farmers' decision regarding allocating land to high as against low value crops. This explain that, though it is important to build a market structure in order to influence the better input-use propensities (generally labour and capital) by the farmers, the same is insufficient for improving farmers' orientation to increase the inelastic factor of production i.e., land in favour of high value crops.

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