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Feasibility Check for Diversification towards Horticultural Production*

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Abstract

Horticulture can be promoted as a means of agro-diversification for the second green revolution in India, providing the much-needed impetus to the growth of agricultural sector, through increase in trade, income and employment. The Indian agriculture is diversifying towards production of high-value commodities along with the increasing role of smallholding farmers. In this paper, the economic feasibility of diversifying towards horticultural crops has been examined. The benefit-cost analysis has been done and a comparison of commodities of foodgrain and horticultural group has been presented to evaluate the feasibility of diversification. Supply constraints in terms of poor supply-chain management have been highlighted. The BCR of horticulture has been reported to be more than that of cereals. This implies that it is profitable and economically feasible to shift land from cereals to horticultural crops. It has been argued that the reason why the farmers still continue to cultivate the staple foodgrains is their demand for self-consumption. The study has cautioned that the re-allocation/diversification of land should be done in a manner such that optimal output and income can be generated, keeping in mind the domestic demand, exports target and improvement in the economic conditions of farmers. The diversification plan for the horticultural sector needs to be identified as it offers an attractive option and a major source of pushing up growth of the agricultural sector. The paper has pointed out that the policy issues involved on the production, marketing and policy fronts can bring about the desired growth in the agricultural sector.

Introduction

India's main focus was only on the policies related to grains and cereals, till the launch of National Horticulture Mission, 2005-06. It is only after this, that the country started paying attention towards extracting the real potential of the horticultural sector. Due to the perishable nature of horticultural products and their short life-span, the growth of this sector has been constrained. Added to it are India's low crop productivity, limited irrigation facilities and underdeveloped

infrastructural support like cold storages, markets, roads, and transportation, which have increased the woes of Indian horticulturists. In spite of this, India is the second largest producer of fruits and vegetables in the world, after China. It accounts for about 15 per cent of the world's total vegetables production and about 8 per cent of the world's fruits production. And as India begins to market its agricultural produce across political boundaries, it can add new dimensions to its commercial viability in agriculture.

In a holistic way horticulture can be promoted as a means of agro-diversification for the second Green Revolution in India, providing the much-needed impetus to the growth of agricultural sector, through increase in trade, income and employment.

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The Indian agriculture is diversifying towards the production of high-value commodities along with the increasing role of smallholding farmers. But, India is facing a big challenge in balancing its dual objectives of food security and crop diversification to increase farm income.

Objectives and Data Collection

The main objective of this paper was to examine the economic feasibility of diversifying towards horticultural crops. The benefit-cost analysis has been carried out and a comparison of commodities of foodgrain and horticulture group has been conducted to evaluate the feasibility of diversification. Supply-side constraints in terms of poor supply-chain management have been highlighted. The paper has suggested some policy recommendations to make this sector grow and also to manage the dual policy goals of the government. The paper has been broadly focused on fresh fruits and vegetables using the data from 1990-91 to 2004-05 from various reports published by the National Horticulture Board (NHB), Ministry of Agriculture, and Reports of the Commission for Agricultural Costs and Prices.

Past Trends

Agricultural diversification is an important instrument for the economic growth of farm-households. Agricultural diversification largely depends on the opportunities and responsiveness of farmers to technological breakthroughs, consumer demand, government policy, trade arrangements and development of irrigation, roads, and other infrastructure (Kumar and Mittal, 2003). Changes in cropping patterns are responsive to these factors. In the recent past, India has experienced a considerable degree of crop diversification towards the horticulture sector and commercial crops and there has been a shift in the area away from foodgrains — rice, coarse cereals and pulses — towards oilseeds, cotton, fruits and vegetables (Radhakrishna and Ravi, 1990; Kumar, 1998; Murthy 2000; Mittal, 2006). Within the horticulture sector also, besides spices, fruits and vegetables are the major crops where the area under cultivation has increased (Mittal, 2007). This gain in area under

horticulture and mainly under fruits and vegetables is a collective impact of diversification of the production pattern of producers and increased demand of the consumers due to shift in their consumption pattern (Mittal, 2006).

Results and Discussion

The growth rates in area and production of fruits and vegetables over the period 1990-2004 and different sub-periods have been presented in Table 1. For fruits, the area growth was 3.28 per cent in 1990-95, which increased to 6.67 per cent during the period 2000-04. The production of fruits grew at the rate of 9.43 per cent in the initial period, but later the growth started declining. The area under vegetables increased at the rate of 3.15 per cent during 1995-2000, which later declined. During the same period, high production growth was also observed. The overall area growth was 3.38 per cent for fruits and 2.10 per cent for vegetables during the period 1990-2004. The production growth was 3.06 per cent and 3.95 per cent for fruits and vegetables, respectively.

Table 1. Average annual rates of growth in area and production for fruits and vegetables: 1990-2004

Period	(in per cent)			
	Fruits		Vegetables	
	Area	Production	Area	Production
1990-95	3.28	9.43	-1.00	4.67
1995-00	2.58	1.62	3.15	6.22
2000-04	6.67	3.32	1.82	2.08
1990-04	3.38	3.06	2.10	3.95

In spite being one of the world's largest producer of fruits and vegetable, India does not have much of their exports volume, due to huge domestic demand. Besides, there are severe supply constrains and huge post-harvest losses which lead to lower availability of produce. To emerge as a major exporting nation, we need to produce enough surpluses. Along with efficient and good agricultural practices, more area might be needed to be shifted towards horticulture. Through the benefit-cost analysis, a feasibility check has been done to analyze if it was economically

profitable and feasible for the farmers to shift their land towards horticultural crops.

The benefit-cost ratio (BCR) was computed as an indicator of economics of investment. This ratio depicts the financial return for each rupee invested in cultivation. BCR is defined as:

$$\text{BCR} = \text{Gross returns} / \text{Cost of cultivation}$$

where, Gross returns = Yields * Price

Cost of cultivation¹ = C2 = Cost on all the inputs, depreciation, and rent and implicit value of land and family labour (for cereals). For the horticultural produce, the cost estimates have been compiled by researchers and officials working with the National Horticultural Mission.

The data on cost of horticultural products were not available in the published format and therefore most of the estimates were obtained through primary survey and compilation of different input costs from various sources available². In computation of the cost of horticultural produce, establishment cost is a very important component. Since fruits have a gestation period in between the time of investment in setting up an orchard and getting the commercial benefits, the total cost of establishing and managing the orchard was spread over the total period to have the average annual estimates of the cost of cultivation. The establishment cost included expenditure on land preparation, cost of planting material, labour costs for digging pits, layout designing, input cost, etc. The maintenance cost included investment on fertilizers, manures and pesticides, labour cost, expenditure on irrigation, harvesting, post-harvest handling and transportation cost. For fruits, intercropping is very common in the fruit orchards, especially during the gestation period. All the costs were net of the returns from these intercroppings. The average annual costs were estimated taking into

account the number of years lag before orchard became commercially viable.

In Table 2, BCR has been presented for major cereals in selected states and a similar exercise has been repeated for some fruits and vegetables. The results show that in Andhra Pradesh the gross returns were marginally more than the cost of cultivation for only maize and paddy, whereas for ragi and wheat, the cost realisation was poor. The producers of staple foodgrains in Andhra Pradesh were not able to meet even the cost of their production. Similarly in Bihar, Karnataka, Maharashtra and Uttar Pradesh also, the BCR of the cereals production was less than one and in many cases it was even less than 0.50³. On the other hand, for fruits and vegetables, the BCR was above 1 in all the cases and even higher. It is indicative of the economic benefit of crop diversification towards fruits and vegetables. In Uttar Pradesh, based on the economics of 10 years of mango plantation with 100 plants per hectare, the annual BCR was computed as 4.60. Aonla and litchi were the intercroppings in this region, but in the calculation of BCR, the returns from these intercroppings were discounted. Litchi and aonla in Uttar Pradesh and irrigated onion, tomato and brinjal in Karnataka, depicted the value of BCR as more than 2. This indicates that the gross return were double of the cost of cultivation of the produce.

The reason why the farmers still continue to cultivate the staple foodgrains is for the purpose of their self-consumption. A little saving that a farmer could make inspite of a low BCR was due to the fact that in actual cost incurred, implicit cost of family labour and land was not included. In recent times, the scenario is getting even worse because the prices of inputs are increasing, and the market price of wheat and rice has also increased, but the yields are continuously declining. Thus in the long-run, the rising

¹ Among the cost definitions of A1, A2, B1, B2, C1 and C2 given by the Commission for Agricultural Costs and Prices (CACP), the ideal one is C2 which is used to compute the BCR for cereals. The cost estimates of cereals were obtained from the published reports of the CACP. C2 is the cost value on all the inputs, depreciation, and rent and implicit value of land and family labour.

² The information used for computation pertained to the year 2005. It is only after the launch of National Horticulture Mission, that information on cost of cultivation of horticulture produce is being recorded. But no data have yet been published.

³ If the benefit-cost ratio is 0.50, then it means that for every rupee invested in one hectare of land under cultivation for a given produce, the return is about Rs 0.50 per hectare after the sale of the produce.

Table 2. The benefit-cost ratios of major cereals, fruits and vegetables in selected states of India: 2005

State	Crop	Cost of cultivation (Rs/ha)	Gross returns (Rs/ha)	Benefit-cost ratio	
Andhra Pradesh	Ragi	15768	6453	0.41	
	Jowar	12486	6255	0.50	
	Maize	11983	10506	0.88	
	Paddy	27043	25408	0.94	
	Bhindi/ Okra	36003	57675	1.60	
	Brinjal	58692	112652	1.92	
Bihar	Maize	12577	9447	0.75	
	Paddy	12304	9816	0.80	
	Wheat	14467	13147	0.91	
	Lichi	14122	23798	1.69	
Karnataka	Ragi	13125	6256	0.48	
	Jowar	7298	4512	0.62	
	Maize	13484	11156	0.83	
	Paddy	27563	26238	0.95	
	Gherkin	27145	29789	1.10	
	Grape	224041	342375	1.53	
	Onion dry land	14227	23152	1.63	
	Onion irrigated	44932	111259	2.48	
	Bhindi/ Okra	52314	89218	1.71	
	Beans	33093	59748	1.81	
	Tomato	109544	220214	2.01	
	Brinjal	52576	112292	2.14	
	Maharashtra	Jowar	13225	6223	0.47
		Bajra	12080	6093	0.50
Brinjal		87530	111909	1.28	
Bhindi/ Okra		44122	57812	1.31	
Uttar Pradesh		Bajra	9218	5223	0.57
	Maize	11240	7041	0.63	
	Paddy	15844	14549	0.92	
	Wheat	16273	17193	1.06	
	Litchi	15411	40257	2.61	
	Aonla	15214	40257	2.65	
	Mango	11365	52264	4.60	

cost of cultivation is making it unprofitable for farmers to cultivate staple foods.

Policy Implications

The BCR of horticultural products has been found more than the BCR of cereals. This implies that it is profitable and economically feasible to shift land from cereals to horticultural produce. Since the

dual goals of food security and higher income are to be met, it is equally important that re-allocation/ diversification of land should be done in a manner such that optimal output and income could be generated, keeping in mind the domestic demand, exports target and improving the economic conditions of farmers. Regions where productivity of rice, wheat and other basic cereals has declined, or it is not profitable for farmers to produce them, the farmer

needs to diversify his cultivation portfolio. In the year-round cultivation, even if a small proportion of land is diversified towards horticultural commodities, and more importantly towards vegetables, then the income level of farmers can largely improve.

Besides the issue of improving income, diversification is also needed to meet the increasing domestic demand of fruits and vegetables. But, there are various supply-side constraints which are keeping the per unit productivity and per unit availability low. The horticultural sector is constrained by traditional production techniques, huge post-harvest losses and poor marketing strategy. Inefficiency in pest management, poor access to credit, high cost of production, lack of information and poor infrastructure add to these constraints. These constraints can actually erode the benefits that may accrue from diversification. Thus on the production front, the most crucial factor impacting the growth of horticulture sector is the low and declining productivity. The decline in productivity as well as the low productivity rates, as compared to the world's highest yields are quite visible in literature (Mittal, 2007). For all the fresh fruits and vegetables, the potential yield is manifold higher than the existing yields. But certain activities taken up in contract farming mode give better yields. This further implies that if the farming is taken up in an organized manner and use of inputs, their application, and harvesting techniques are imparted to the producers, then the yield levels can be raised.

On the marketing side, the general constraints faced by this sector are timely delivery, grading, packaging, quality of produce, poor market infrastructure, agro-processing plants, marketing credit, proper market organization, proper pricing, uniform grading and standardization of weights and measures; inadequate and poor dissemination of market information and poor post-harvest handling; and low and declining productivity. The marketing costs are also included in the calculations of BCR for fruits and vegetables. If the markets are brought closer to the farm-gate or in the supply chain, and the produce is directly procured from the farm-gate, then it will be more beneficial for the farmers, as they will be getting better prices for the fresh quality produce, and in addition, the cold storage facility in

the transportation would preserve the quality further, so that the consumers get better quality produce. It would further lower down the post-harvest losses and thus, the quantity saved in the process will be an addition to the net availability. The infrastructure to increase efficiency and linkages between all the stakeholders of the supply chain are not efficient. This is affecting the growth potential of the horticultural sector. Timely availability of inputs, and development of organized input market and infrastructural, storage and distribution facilities will add to the productivity. The management of these constraints will add to the productivity of this sector. Development of cold-chain network will greatly help in reducing the post-harvest losses of fruits and vegetables. But the establishment costs of cold-chain infrastructure are high and will require investment of at least Rs 18,000 crore to Rs 20,000 crore in the next five years⁴. A study by Raghunath *et al.* (2005) has estimated that strengthening of supply chain can increase the benefits to consumers and producers by 20-25 per cent in the most perishable commodity like tomato. Due to inefficiency in the supply chain, the price received by the farmers is only 24 to 58 per cent of the price that the end consumer pays.

On the policy front, there is a need to integrate agricultural markets and supply chains. The implementation of Agricultural Produce Marketing Committee (APMC) Act may hinder the road of new private initiatives in modern retailing and upgrading of the supply chain, specially in the field of fruits and vegetables. In the case of setting-up of SAFAL market in Bangalore, the Government of Karnataka had amended its APMC Act in favour of both farmers and consumers. Adoption and implementation of model APMC Act by all the states will help move forward. The horticultural sector can be linked to futures market along with strengthening of the institution of contract farming. The government should create a positive environment that will ensure a mutually beneficial relationship between the farmers and the organized sector. Along with investment in infrastructure, development of extension activities and linkages with farmers are also important areas where government can play influential role.

⁴ Confederation of Indian Industries (CII) in Cold Chain Summit, 2007

Fruits and vegetables can also become a part of futures trading through the national commodity exchanges. SAFAL Market collaboration with Multi Commodity Exchange (MCX) for creating a SAFAL National Exchange exclusively for horticultural produce spot trading is a step forward in this direction. A transparent price system would help in generating price awareness, leading to a better price discovery to producers. It would further lead to linking up of all the stakeholders and also reduce post-harvest losses due to better storage and transportation facilities.

The development of horticultural sector should be accompanied with the growth of agro-processing industry. Volumes saved in post-harvest losses are the surpluses generated, without additional cost. Additional non-farm rural employment can also be generated by the development of horticulture-based agro-processing units. This sector needs to be developed as an organized industry and has to be managed collectively by all the stakeholders, may be with farmers as the entrepreneurs.

Conclusions

India being a land of small and marginal farmers, studies have been advocating that 'small farmers are going to feed India'. Therefore, it is important to mobilize them and help them to diversify to meet the increasing domestic demand of horticultural products. As identified in the African nations, small farmers are the key to initiate the horticultural revolution and with technical change and increase in the international competitiveness, large-scale operations and vertical integration take place. The diversification towards horticultural sector needs to be planned as it offers an attractive option and a

major source of pushing up growth of the agricultural sector. Appropriate management of the issues involved on the production, marketing and policy fronts can bring about the desired growth levels in the agricultural sector.

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