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Role of non-government organisations in horticultural development in India

Importance of horticulture

Horticulture is an important component of agriculture and a significant constituent of a healthy diet with minerals, vitamins, antioxidants and phytochemicals having medicinal values. It covers high value crops like vegetables, fruits, spices, aromatics, medicinal herbs, flowers and ornamental foliage, with wide opportunities for value addition and employment all-round the year. Horticulture provides raw materials for many industries such as food processing, pharmaceuticals and aromatics, apart from highly potential ornamental plant and seed production opportunities, across the country. Fruits and vegetables are delicious and essential for combating malnutrition, particularly in children.

Horticulture in India started receiving importance in the late 1980s, when the country attained self-sufficiency in food production and the priority was shifted to production of oilseeds, fruits and vegetables. With the economic reforms in the early 1990s and significant rise in the income of the lower, middle and upper-middle income groups, the demand for horticultural produce started increasing progressively and fruit and vegetable cultivation started becoming attractive. In 1980-81, horticultural crops occupied an area of 7.0 million ha, of which 4.9 million ha were under fruits and vegetable crops while 2.1 million ha were under condiments and spices, covering only 4.5% of the total cropping area. After 25 years, in 2005-2006, the total area under horticulture had increased to 12.4 million ha (9.3 million ha under fruits and vegetables and 3.1 million ha under spices), with an average annual growth of 3.12%, representing 6.5% of the total area (Ramesh *et al.* 2008). The driving force for this shift was the increase in returns which rose from ₹ 70,000 in 1980-81 to ₹ 95,400 per ha in 2005-06 while the net income of cereals increased from ₹ 7,800 to ₹13,400 during the same period.

Present scenario

The total horticultural output which was 167 million tonnes in 2004-05, maintained a steady annual growth of 2.7% to reach 329.86 million tonnes (102.76 million tonnes of fruits and 196.27 million tonnes of vegetables) in 2020-21, covering an area of 27.23 million ha. The production of plantation crops was 16.60 million tonnes and that of spices was 10.54 million tonnes during the year. Table 1 presents the area under different fruit crops and the total production in India in 2000-01 and 2020-21. Mango continued to occupy the largest area of 2.315 million ha followed by citrus and banana. It may be observed from the table that the highest increase in production over the last two decades was recorded in papaya (710%), followed by grapes (476%), banana (433%), pomegranate (413% in 10 years) and guava (401%), while many other fruit crops registered a growth of 200-250%. Such high growth rate of production in certain crops can certainly be attributed to factors such as release of promising new varieties, easy access to good quality planting material, improved production technologies, efficient post-harvest management and marketing, apart from the growing demand for these fruits. Farmers growing these crops formed their own associations for aggregation, grading and marketing of the produce. Associations of grapes and pomegranate growers developed their own cultivation practices, in consultation with public research institutions, to meet international quality standards and exported fruits to many countries. The growth rate of some other fruit crops has been slow because of lack of organised effort to promote new technologies and develop the value chain. A glaring example has been the status of the cashew nut industry. India was the world leader in cashew nut export since 1950s, but due to outdated processing infrastructure and lack of technical support to cashew growers, the cashew nut yields remained stagnant at 762 kg/ha. On the contrary, Vietnam, where cashew production was introduced in the late 1980s has captured 65% of the world cashew nut export, while increasing the average raw cashew nut yield to 3,041 kg/ha. There are many fruit crops which are under neglect, due to lack of technology and infrastructure (Hegde 2021).

Table 2 presents the status of vegetable production in the country. Potato, onion and tomato were the major crops occupying about 43.6% of the area under vegetable production, and the other five crops, namely brinjal, peas, okra, cauliflower and cabbage, occupied 25.4% area. The rest of the vegetable crops covered the remaining 31% area. There was 500% increase in the production of onion over 20 years between 2000-01 and 2020-21, partly because of 300% increase in the cultivated area and also because of the introduction of new technologies and varieties. The production of peas and tomato increased by 294% and 270% over the last 20 years, due to increase in the area by 191% and 180% respectively. From this data, it can be observed that there has been no significant breakthrough in giving a boost to vegetable production. The important reasons for slow progress in vegetable production are lack of value chains,

particularly to transfer new production technologies, lack of grading and packaging, transportation support for marketing, and absence of market information services. Unlike fruit growers, vegetable growers are not organised as these are seasonal crops, and are not grown regularly. Being highly perishable, farmers experience heavy losses due to wastage in the absence of proper transportation and marketing facilities. Small farmers engaged in vegetable production are compelled to sell their produce to local traders, who invariably indulge in unfair trade practices.

There has not been any significant development in the production of spices, although India is the top exporter of spices and produces over 75 varieties out of the total 109 products listed in the International Organisation for Standardization (ISO). Indian exports accounted for 20% of the global trade, worth USD 4 billion in 2020-21. The major products exported under this category were chilli, cumin, turmeric, ginger and cardamom. There is good scope to increase the production of spices by establishing a strong backward linkage for mobilizing farmers to adopt advanced technologies. Floriculture also provides an excellent opportunity for small farmers to enhance their income. The area under floriculture has increased from 0.106 million ha in 2001-02, to 0.339 ha in 2018-19, while enhancing the production from 0.535 million tonnes to 1.99 million tonnes during the same period. This sector generated an export revenue of USD 81.94 million in 2018-19, which is fairly encouraging.

Further analysis of the production data reveals that although the horticulture sector has been maintaining a steady annual growth of 3-5%, there is good scope to further improve the yield. It has been reported that small farmers engaged in horticultural production have been facing several challenges in the areas of increasing yields, controlling pests and diseases, timely harvesting, grading, packing, storage and marketing of the produce. Realising these problems, various initiatives were undertaken by the Government and the private sectors with very encouraging results. However, more efforts are needed to organise small farmers and develop strong value chains to enhance the production of most of the horticultural crops in the country.

Strategy for giving a boost to Indian Horticulture

Expanding horticultural production is an opportunity to enhance income through cultivation of high value crops, maintaining the land under green cover for longer period, building soil fertility and organic carbon, conserving soil moisture and providing an opportunity to small holders to earn sustainable livelihood. To achieve this goal, the following aspects should be addressed:

Introduction of new technologies: Introduction of new varieties, which are attractive to consumers and climate resilient to perform well even under adverse conditions, use of modern tools such as instant soil testing for residue-free nutrition management, automated irrigation devices to irrigate as per the requirements of the crops, monitoring crop health and pest and disease infestation by using GIS and spectrophotometers, biological plant protection and developing kits for testing the quality of the produce with non-destructive sampling, are some the technologies which have not reached most of the farmers in the country. Suitable mechanisms have to be developed to transfer these technologies, particularly to small farmers.

With the advancement in space technology and GIS, the state organisations can now precisely generate information on newly sown area under different crops, incidences of pests, diseases and general health status of the field crops, likely arrivals of produce during the week, weather changes expected, etc. and release such information on daily or weekly basis to farmers, with suitable guidelines. This can be a major breakthrough to suitably plan the farming operations and enhance the production.

Producers' organisations and mentoring of small farmers: Support for backward and forward linkages has been the biggest problem encountered by most of the farmers. Small farmers need good mentoring and support for procuring inputs, adopting modern technologies, using farm machinery, grading and transportation of the produce. Linking with financial institutions, Government agencies, market information and service providers is also essential to take advantage of the available technologies and services.

Processing of the produce: Post production handing and processing of fruits, vegetables and spices has excellent scope for wide scale expansion, which will not only add value but also generate assured employment. For fruit and vegetable processing, industries in the private sector can be very efficient. It is also essential to organise the farmers at the village level to tie up with these industries.

Value chain development: The success of the agriculture sector depends on the efficiency of the value chain, which can address most of the challenges faced by the farmers as well as the industry. Key players who can contribute to the growth and profitability of the horticultural sector are research institutions who have developed various production and processing technologies, state development departments who provide policy support and financial subsidies, financial institutions who meet the credit needs and industries involved in supply of equipment, biological and chemical inputs and processing of the produce. These agencies should come on a common platform to work with farmers. Non-Government organisations can also play a very important role in providing various services to coordinate and operationalize the value chain. The programme should be technology driven and implemented by the NGOs and industries.

Considering the role of research institutions, it may be ideal if the Government of India can undertake an exercise to prepare an action plan for expanding the production of selected fruit, vegetable, spices and ornamental crops by bringing various stakeholders for each value chain, under the respective National Research Institute involved in the development of those crops. These institutions can also carry out periodic monitoring of the progress of different players in the respective value chain, while the management of the value chains can be handled by other players like business groups involved in processing or farmers' organisations and NGOs, who are committed to this programme.

Table 1. Area and production of major fruit crops in India in 2000-01 and 2020-21

Crop	Area (000 ha)		Production (000 tonnes)		Yield (tonnes/ha)		% Increase in production (2000-01 to 2020-21)
	2000-01	2020-21	2000-01	2020-21	2000-01	2020-21	2000-01 to 2020-28
Mango	1077.6	2315	8715.6	20899	9.0	9.03	242.4
Citrus	295.7	1064	4197.7	14071	10.37	13.22	339.3
Banana	383.9	916	7790.0	33832	20.3	36.93	433.0
Apple	194.5	312	1147.7	2057	5.9	6.59	222.9
Guava	94.0	304	1095.1	4433	11.7	14.58	401.2
Pomegranate	107.3*	273	743.1	3068	6.9	11.24	412.9*
Jackfruit	166.7*	189	1175.7	1931	7.05	10.22	164.2*
Grape	32.4	152	668.2	3213	20.6	21.23	476.4
Papaya	45.2	144	805.3	5951	17.8	41.33	710.3
Pineapple	57.1	108	768.5	1777	13.5	16.45	233.1
Walnut	122.7*	108	233.1	284	1.90	2.63	183.8*
Watermelon	-	104	-	2983	-	28.68	-
Anola	108.1*	99	1266.5	1216	0.92	12.28	- 4.0
Litchi	49.3	98	243.8	728	1.99	7.43	302.7
Sapota	52.0	77	593.5	816	11.41	10.60	209.5
Muskmelon	-	60	-	1312	-	21,87	-
Ber	40.5*	52	438.0	559	10.81	10.75	172.6
Custard apple	19.55*	45	135.6	390	6.94	8.67	287.6
Pear	42.3*	42	295.1	279	6.98	6.64	- 5.5
Plum	23.9*	23	74.1	86	0.96	3.74	116.2
Peach	19.2*	18	97.94	117	5.10	6.5	119.5
Passion fruit	18.2*	12	100.5	56	0.46	0.56	-54. 0
Almond	21.4*	9	10.0	11	0.47	1.1	110.0
Kiwi		5		14		2.8	-
Strawberry		3		20		6.67	-
Others		272		2660		0.78	-
Total fruits		**6806**		**102764**		**14.83**	

Note: Production in 2020-21 based on 2nd Advance Estimate. * Data is for the year 2011-12.
Source: National Horticulture Board 2014; Indian Horticulture Database 2013; DAC&FW 2021.

Role of non-government organisations in horticultural development

It has been observed in the past that in spite of good intentions and well-conceived development projects, farmers have been facing several hurdles because of lack of facilitators and infrastructure. This role has been very efficiently played by several committed Civil Society Organisations or Non-Government Organisations to ensure success. These NGOs, who work closely with small farmers, motivate them to take active role in development, train them to adopt new skills, build their confidence, organise them to form cohesive groups to work together and help them to establish contact with development institutions, banks and markets. If the NGOs are prepared to fill the gaps wherever necessary, even the illiterate farmers will come forward to accept new technologies. Thus, NGOs can be an important player in developing the value chain for different horticultural crops, particularly for active participation of small farmers.

One of the most successful examples in India is the promotion of the Wadi Programme (Tree based farming) for rehabilitation of the Scheduled Tribe families in Gujarat, Maharashtra and many other states by BAIF, a reputed NGO based in Pune. BAIF initiated a programme to develop the denuded lands owned by these families by establishing mango and cashew orchards, while the interspace was used for growing food and vegetable crops. As soon as the project implementation was initiated, the field team faced several hurdles, including reluctance of the alcoholic men to work. So, women were motivated to take part in orchard development activities. However, as the women were often falling sick, activities like healthcare, supply of clean drinking water, family hygiene and sanitation, and awareness about ill-effects of alcohol, etc. were also initiated in this horticultural project. When the orchards

Table 2. Area under major vegetable crops and total production of in India in 2000-01 and 2020-21

Crop	Area 000 ha		Production 000 tonnes		Yield tonnes/ha		Increase in production %
	2000-01	2020-21	2000-01	2020-21	2000-01	2020-21	2001 to 2021
Potato	1259.5	2250	24456.1	53687	19.4	23.64	217.2
Onion	495.8	1654	5252.1	26916	10.6	16.48	500.6
Tomato	458.1	852	7462.3	21003	16.3	24.42	270.0
Brinjal	502.4	758	8347.7	13154	16.6	17.38	153.4
Pea	303.3	573	2038.2	5823	6.7	10.32	293.6
Okra	347.2	532	3324.7	6513	9.6	12.37	195.7
Cauliflower	202.8	463	4890.5	9038	18.1	19.49	187.8
Cabbage	177.3	404	5678.2	9586	22.0	23.49	168.5
Tapioca	238.9	163	6515.9	5479	27.3	30.97	- 27.7
Sweet potato	131.9	118	1130.3	1209	8.6	10.22	106.7
Chillies (Green)		399		4393		10.40	
Beans		219		2169		9.69	
Radish		205		3239		15.98	
Bottle gourd		187		3165		17.39	
Cucumber		109		1664		15.54	
Carrot		105		1865		18.44	
Pumpkin		105		2265		21.87	
Bitter gourd		101		1174		11.90	
Pointed gourd (Parwal)		61		794		12.92	
Capsicum		35		560		16.11	
Elephant foot yam		36		941		24.5	
Mushroom				243			
Others						14.63	
Total		**10803**		**196268**		**18.08**	

Note: Production in 2020-21 based on 2nd Advance Estimate. * Data is for the year 2011-12.
Source: National Horticulture Board, 2014; Indian Horticulture Database 2013; DAC&FW 2021.

started fruiting, as there was no local market and the local traders started exploiting the wadi owners, it was realized that the entire process of aggregation, grading processing and market should be established under the farmers' cooperatives. The NGO being flexible, it was possible to modify the action plan as per the local needs and act immediately without waiting for approval from the head office. The field workers did not have any barrier to work with the tribal families. In any routine development project implemented by the Agricultural Department, health-related activity will never be allowed. After addressing the initial hurdles, the members of the community were empowered to take over these responsibilities of managing the value chain. This programme which benefitted over 2 lakh tribal families, had a success rate over 90% and the programme is being replicated by other NGOs. There are many such success stories of other NGOs, who have been helping the farmers' organisations to take up agricultural development and collaborate with processing and marketing agencies for value addition.

Several fruit and vegetable growers' organisations and decentralised nurseries are also operating successfully. It is mainly because of the commitment, transparency and direct involvement of the farmers that the rate of success of such projects has been high. The key to success of any NGO is to work as a catalyst, provide necessary support whenever needed and motivate them to take over the responsibility on their own, because nobody else can look after them better. For improving the efficiency of the NGOs, the government may link them with the research Institutions for capacity building and provide the development support to farmers through them with a commitment for accountability. Such a programme can be very transparent, cost effective and sustainable in the long run.

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