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Growth of horticulture sector in India: Trends and prospects

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ABSTRACT

Horticulture sector is recognised to have the potential to raise the farm income, provide livelihood security and earn foreign exchange. However, focused policy interventions are needed to realise the potential of the sector. The study examines the trends of the horticultural sector in India and identifies the growth prospects. The consumption of selected fruits and vegetables has grown at a rate of 18-23% and 10-20% in rural areas during 1993-94 to 2011-12, still the quantity consumed is less than the recommended dietary requirements. Out of the overall growth rate of 3.56 per cent in agriculture during 2000-2011, fruits and vegetable alone accounted for 19.2%. The share of high value crops in value of output of the agricultural sector is also on increase, both in absolute terms as well as in shares. Horticultural sector accounts for about 37% of the total exports of agricultural commodities, and the exports have recorded sustained rising trend. Across states, there is wide variation on the growth performance. The major concerns of the sector are improving the productivity through research and development, enhancing the share of value added products, geographical diversification of exports and enhancing the infrastructure including cold storage and rural roads. The public sector research needs to be strengthened factoring in the constraints of small holders who constitute the major producers.

Key words: Diversification, Exports, Farm income, Horticulture growth, Small holder, Total factor productivity, Value addition

Horticulture is increasingly recognised as a sunrise sector, owing to its potential to raise farm income, provide livelihood security and earn foreign exchange through export. The diverse agro-climatic conditions and rich diversity in crops and genetic resources enable India to produce a wide range of horticultural crops round the year. To cite an example, India produces a tropical fruit like mango and sub-tropical fruit like apple at same season in a year. Horticulture sector encompasses a wide range of crops like fruits, vegetables, flowers, spices, plantation crops like coconut, beverages like tea and coffee and some medicinal and aromatic plants. Statistics provided by National Horticulture Development Board indicate that, by accounting for 13% of the global production of fruits and 21% of vegetables, India is the second largest producer, after China, in both the commodity groups (Horticultural Statistics at a Glance 2017).

The growth saga of the horticulture sector is distinctly different from that of agriculture sector as a whole. The Green Revolution (GR), which came in late 1960s and early 1970s, focused on the immediate food security issues. The consequent seed-fertilizer- water technology packages and policy of public investment, price supports and inputs have helped India to attain food self-sufficiency. The late 1980s saw diversification towards other crop groups like oilseeds, commercial crops like sugarcane and horticultural crops. The major factor towards this is the high income generating potential rather than food security. Livestock was an integral component of the diversification process. Economic reforms and policies of 1990s further increased the speed of diversification in favour of horticulture crops (Chand *et al.* 2008). This is on account of the increased domestic demand from high value food commodities as well as for export markets. The diversification process that is seen within agricultural sector also got transmitted to the horticultural sector.

In tune with the emerging demands, India brought forth several technology and policy initiatives for promoting horticulture. The most important among is the newer technology packages spanning from production to post-harvest. Protected cultivation, precision technologies including automation, usage of biotechnology are some of the examples in this direction. Also newer initiatives were made in the sphere of infrastructure development including cold storage, quality assurance, and streamlining and hand holding to participate in the export markets. Further, the Government has facilitated emergence of newer institutional

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mechanisms to strengthen vertical and horizontal linkages through contract farming. Other significant dimension is to capitalise the power of collectives. Formation of Farmer Producer Companies that could bring about the sea change in the input and service delivery systems is promoted. Evidence suggested that the net return in horticultural crops is higher than other crops.

The government of India has proposed to doubl farmer's income by the year 2022. It is increasingly being recognised that horticulture will remain an integral component for the strategy to achieve this goal. This paper is an attempt to analyse the changing pattern and trends in the growth of the horticulture sector, the lessons that can be imbibed from the growth saga hitherto and suggest broad policy contours required to further the horticultural growth in tune with changing demands.

MATERIALS AND METHODS

The paper uses mainly secondary data collected from various government sources. Data on production was collected from Horticultural Statistics at a Glance, 2017, a Ministry of Agriculture and Farmers' Welfare publication, area under different crops was taken from Land Use Statistics data source of Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare. Export import data was collected from the Agricultural and Processed Food Products Export Development Authority's (APEDA) database. The study utilises trend growths and shares.

RESULTS AND DISCUSSION

Change in consumption pattern of horticultural products

Consumption of various horticultural commodities including fruits and vegetables are on rise. Table 1 indicates that during 1993-94 to 2011-12, in rural areas, consumption of most of the fruits is increasing at an annual growth rate ranging between 18-23% for fruits and 10-20% for vegetables. The rural areas have registered higher consumption growth compared to the urban areas expect for apple. The growth rate was lower in the commonly consumed commodities like potato and onion. During the period, the per capita monthly consumption of mango has increased from 60 to 160 g in rural areas and from 120 to 202 g in urban areas. However, consumption of high value fruit was quite low at 58 g in rural areas and 191 g in urban areas. The low level of consumption of fruits and vegetables could be inadequate to meet the nutritional requirements, as per the World Health Organisation guidelines. The demand for fruits and vegetables is more income elastic than that of food grains. Further, the demand for high value commodities is bound to increase in the times to come, owing to a rise in real per capita income, growth in population and urbanisation (Rao *et al*. 2006). Researches have shown that between 1983 and 2004, the budgetary share of consumers for fruits and vegetables in total food expenditure has increased across all income groups (Kumar *et al*. 2011). The export of the horticultural commodities has also shown greater prospects and this trend is likely to continue. In this context, it is worthwhile to note that by 2030 the demand for fruits and vegetable would increase to 110 and 180 million tonnes, envisaging an increase of 155 and 95%, respectively over the base year of 2000 (ICAR 2011). To meet the increased demand, the productivity needs to be improved, for which the key lies at the research induced total factor productivity growth (Suresh and Mathur 2016).

Trend in the value of output from horticulture sector

The data provided by the Central Statistical Office indicates that the value of output (VOP) from the overall agricultural sector has grown at the rate of 3.56% per year during 1999-00 to 2010-11, to reach an overall value of ₹ 794.7 thousand crores as on 2010-11 (Table 2). Out of this, the horticulture commodities including cash crops, spices and fruits and vegetables accounts for about 1.98%, 2.33% and 19.24%, respectively. Among these commodities, high growths are noted for cash crops (12.1%), fibre (9.56%)

Table 1 Trend in major fruits and vegetable consumption

Crop		1993-94	1999-00	2004-05	2009-10	2011-12	CAGR
Banana (No.)	Rural	2.20	2.48	2.37	3.86	4.18	18.84
	Urban	4.48	5.00	4.14	6.65	6.69	11.48
Mango (g)	Rural	60.00	100.00	90.00	108.00	160.00	22.61
	Urban	120.00	160.00	110.00	158.00	202.00	10.84
Apple (g)	Rural	30.00	30.00	30.00	45.00	58.00	18.81
	Urban	110.00	80.00	115.00	158.00	191.00	19.53
Potato (kg)	Rural	1.24	1.61	1.33	1.67	1.97	10.02
	Urban	1.08	1.32	1.14	1.37	1.61	8.73
Onion (g)	Rural	460.00	580.00	560.00	741.00	842.00	15.65
	Urban	560.00	720.00	720.00	854.00	951.00	13.09
Tomato (g)	Rural	290.00	350.00	340.00	537.00	586.00	20.14
	Urban	460.00	550.00	530.00	757.00	806.00	15.50

Source: National Sample Survey Office

Table 2 Growth and share of different crops in the growth rate, 1990-00 to 2010-11

Crop/crop group	VOP 2011, (₹ '000 crores)	Output share (%)	Growth rate (%)	Sectoral Share in overall growth rate (%)
Cereals	166.00	27.17	1.39	8.93
Pulses	26.30	3.74	2.15	1.98
Oilseeds	60.20	7.06	4.26	8.46
Sugar	28.60	3.88	2.67	2.63
Fibre	30.00	2.51	9.56	7.90
Cash crops	29.00	1.98	12.12	10.48
Spices	22.30	2.33	4.69	3.33
Fruit and veg	157.20	18.75	3.61	19.24
Livestock	233.10	27.53	3.94	31.62
Fishery	42.00	5.04	3.68	5.43
Overall	794.70	100.00	3.56	100.00

Source: Author's computation based on data of Central Statistical Office

spices (4.7%) and fruits and vegetables (3.61%) compared to the overall average growth rate of 3.56% per year.

A decomposition analysis has shown that, in the overall growth, the highest contribution is by fruits and vegetables, accounting for about 19.24%, closely followed by cash crops (10.48%). The share of spices was about 3.33%. The allied sectors of agriculture like livestock and fisheries together have contributed to the extent of 37%. This clearly indicates that the high value commodities like horticulture has contributed to about one third of the growth in total value of output from agricultural sector as a whole. This *inter alia* shows that the high value crops to the tune of 49.7% of the total value of output from agriculture sector in 2011 compared to 44.7% in 2000. On the contrary, the share of the crop sector as a whole has declined from 68.9% to 64.7%.

Diversification towards the horticultural commodities is seen not only in value terms, but in terms of area as well. This is reflected in the share of different crops in the total area under agriculture.Table 3 indicates the changes in the share of major crop/crop groups in India. The table clearly points to a decrease in the area share of food grains- cereals and pulses, and an increase in the share of commercial crops (cotton and sugarcane) and horticultural crops. During 1990-91 to 2014-15, the area under the food grains has reduced by 4 percentage points to reach 51.34%, whereas the area share of fruits and vegetable increased from 3.7% to 5.0%, and that of cotton and sugarcane from 4% to 2% and 6.3% 2.77% respectively.

During 2001-02 to 2016-17, the total area under the horticultural crops increased from about 16.5 million ha to 25 million ha, at an annual trend growth rate of about 3.0%. Correspondingly total production of horticulture commodities increased from 146 million tonnes to 295 million tonnes at an annual growth rate of 5.8%. The production growth is led by growth in yield, at the rate of 2.76%. This point to an increase of 41% in area, 94% in production and 38% in productivity in 2016-17 compared to the base year of 2001-02 (Table 4). The productivity growth at the rate of 2.76% may not be able to meet the demand

Table 3 Trend in the area under different crop/crop groups in India, 1990-91 to 2014-15

Crop/ Crop group	Area (Million ha)			Area share (Per cent)		
	1990-91	2000-01	2014-15	1990-91	2000-01	2014-15
Cereals	103.20	100.70	101.80	55.60	54.20	51.34
Pulses	24.70	20.40	21.70	13.30	11.00	10.94
Oilseeds	24.20	22.80	28.40	13.00	12.30	14.32
Sugarcane	3.70	4.30	5.50	2.00	2.30	2.77
Cotton	7.40	8.50	12.60	4.00	4.60	6.35
Condiments and spices	2.60	2.80	3.40	1.40	1.50	1.71
Fruits and vegetables	6.90	8.20	9.90	3.70	4.40	4.99
Tea	0.42	0.504	0.66	0.22	0.27	0.33
Coffee	0.22	0.35	0.36	0.12	0.18	0.18
Rubber	0.47	0.57	0.51	0.26	0.30	0.26
Total cropped area	185.70	185.70	198.30	100	100	100

Source: Land use statistics, Ministry of Agriculture

Table 4 Current status of horticulture crops

Year	Area ('000 ha)	Production ('000 MT)	Productivity (MT/ha)
2001-02	16592	145785	8.79
2005-06	18707	182816	9.77
2010-11	21825	240531	11.02
2016-17	24925	295164	11.80
Increase over 2001-02 (%)	41.13	94.44	37.77
CAGR	2.98	5.82	2.76
CV	12.52	23.19	11.72

Source: Horticulture Statistics at a Glance, 2017 and authors' computation

for horticultural commodities. Multipronged strategy is warranted to improve the productivity. In view of the limited scope to increase the area under cultivation beyond a limit, intensive cultivation with a view on keeping the sustainability could be the answer. Towards this, agricultural research and development systems carry a significant role. One prime strategy is to alter the crop duration, which can be suitable to multi-cropping.

The horticultural sector is facing a gradual change in the crop composition, with an increase in the share of area under vegetables and fruits. It has increased from 61% in 2001-02 to 68% in 2014-15. The increase in area in absolute terms as well as in terms of the share is because of the relatively high returns in those commodities compared to other horticultural commodities. This is consequent on the diversification of the consumption basket, notably in urban areas towards high value crops and livestock products. Still the per capita consumption of fruits and vegetables is less than the nutritionally required level. Given the expected rise in the per capita income and changes in the dietary preferences, the demand for fruits and vegetables is poised to rise in times to come as well.

The growth in the productivity of the horticultural sector along with the area and price changes has led to an improvement in the share of horticultural commodities in the value of output. The data indicates that at current prices, the share of the horticulture sector as a whole has increased from 19.8% in 1990-91 to 27.6% in 2012-13. A favourable price for horticultural crops also might have contributed to this (Table 5). In terms of value of output, on a per hectare basis, the horticultural crops stand much ahead of other crops. For example, as on 2012-13, the value of condiments and spices, tea, coffee, rubber and vegetables and fruits, ranged from ₹ 1.40 lakh to ₹ 3.3 lakh/ha (Table 6). The value of output from vegetables at ₹ 3.3 lakhs/ha was almost 8 times that from cereals. Between 2005-06 and 2012-13, the productivity on a per ha basis has increased many folds, more sharply in most of the horticulture commodities. The vegetable cultivation is remunerative and its cultivation absorbs large scale man power. Due to labour intensive nature, an increased area under the crop would also provide employment opportunity to youth in agriculture. In that context, the diversification towards high value commodities is labour absorbing and contributes to employment generation (Joshi *et al*. 2004).

Table 5 All India crop group's share in production at current prices

Crop Group	1990-91	2000-01	2005-06	2012-13
Cereals	34.55	32.84	30.18	28.77
Pulses	6.80	4.55	4.45	4.70
Oilseeds	12.99	6.92	9.52	8.60
Sugarcane	4.80	4.60	3.90	5.14
Cotton	3.68	2.58	3.59	5.16
Horticulture	19.76	28.94	28.81	27.55
Vegetables and fruits	17.18	25.35	25.61	24.06
Condiments and spices	2.58	3.59	3.20	3.49
All crops	100	100	100	100

Source: MOSPI report on state wise value of output in agriculture and allied activities

The trend in 2001-02 to 2016-17 shows that 5.3% per year growth rate in production, with an area increase at the rate of 2.8% and the rest by productivity growth (Table 7). A disaggregate growth analysis indicates higher area growth under vegetables, which increased from 6.1 m ha in 2001-02 to 10.3 million ha in 2016-17. Correspondingly the production has increased from 88.6 m tonnes to 175.0 m tonnes with a productivity improvement from 14.4 t/ha to 17.0 t/ha. In case of fruits, the area growth was at the rate of 3.5% per year, with a production growth of 5.6%. However, the productivity growth has been at a higher level

Table 6 Trend in the productivity of crop/ crop groups in India

Crop Group	Value of output (2012-13) ₹ Lakh	Productivity/ha (at current prices)	
		2005-06	2012-13
Cereals	38203060	15042	38824
Pulses	6237404	9818	28877
Oilseeds	11422272	16891	39252
Sugarcane	6827926	45945	1,26443
Cotton	6851528	20438	58064
Vegetables and fruits	31958384	135876	326106
Condiments and spices	4634264	50540	140432
Tea	925366	59274	188850
Coffee	729160	59236	214459
Rubber	1442233	83630	282791

Source: Land use statistics, Ministry of Agriculture and MOSPI report on state wise value of output in agriculture and allied activities

Table 7 Trend in the area under total fruits and vegetables and total horticultural crops, 2001-02 to 2014-15

Year	Total fruits			Total vegetables			Total horticultural crops		
	Area ('000 ha)	Production ('000 MT)	Productivity (MT/ha)	Area ('000 ha)	Production ('000 MT)	Productivity (MT/ha)	Area ('000 ha)	Production ('000 MT)	Productivity (MT/ha)
2001-02	4010	43001	10.72	6156	88622	14.4	16592	145785	8.79
2002-03	3788	45205	11.93	6092	84815	13.92	16270	144380	8.87
2003-04	4661	45942	9.86	6082	88334	14.52	19208	153302	7.98
2004-05	5049	50867	10.07	6744	101246	15.01	18445	166939	9.05
2005-06	5324	55356	10.40	7213	111399	15.44	18707	182816	9.77
2006-07	5554	59563	10.72	7581	114993	15.17	19389	191813	9.89
2007-08	5857	65587	11.20	7248	128449	16.37	20207	211235	10.45
2008-09	6101	68466	11.22	7981	129077	16.17	20662	214716	10.39
2009-10	6329	71516	11.30	7985	133738	16.75	20876	223089	10.69
2010-11	6383	74878	11.73	8495	146554	17.25	21825	240531	11.02
2011-12	6705	76424	11.40	8989	156325	17.39	23243	257277	11.07
2012-13	6982	81285	11.64	9205	162187	17.62	23694	268848	11.35
2013-14	7216	88977	12.33	9396	162897	17.34	24198	277352	11.46
2014-15	6358	88819	13.97	9541	168300	17.64	23417	283468	12.11
2015-16	6301	90183	14.31	10106	169064	16.73	24472	286188	11.69
2016-17	6480	92846	14.33	10290	175008	17.01	24925	295164	11.84
Trend growth rate (%/ year)	3.50	5.60	2.00	3.80	5.30	1.50	2.80	5.30	2.50

Source: Horticulture Statistics at a Glance, 2017 and author's computation

Table 8 Status and trends in growth of area and production of fruits, across states, 2003-04 to 2016- 17

States	Area in 2016-17 ('000 ha)	CAGR (2003-04 to 2016-17)	Production in 2016-17 ('000 MT)	CAGR (2003-04 to 2016-17)
Andhra Pradesh	604.76	-1.79	12098	2.22
Assam	163.29	4.00	2391.19	5.51
Bihar	309.24	0.63	4272.94	2.78
Chhattisgarh	216.99	16.50	2393.51	16.15
Gujarat	392.95	4.48	8482.8	5.54
Haryana	64.00	7.51	900	11.69
Himachal Pradesh	226.56	1.29	639.1	1.95
J&K	286.38	7.05	2116.06	5.02
Jharkhand	98.01	11.30	1026.31	10.70
Karnataka	439.01	4.85	7425.11	5.37
Kerala	244.72	0.97	2467.92	4.99
MP	330.62	18.56	5937.04	18.41
Maharashtra	763.51	-3.72	10378.34	0.36
Odisha	340.86	3.49	2430.1	6.20
Punjab	88.56	5.14	1856.52	7.62
Tamil Nadu	311.25	2.05	6079.95	2.80
Telangana	284.87	-7.9*	3536.74	-8.47*
Uttar Pradesh	470.91	3.82	10353.49	11.25
West Bengal	252.66	3.12	3708.45	3.99

Source: Indian Horticulture database, *CAGR from 2013-14

compared to the vegetable (2.0%). Such sharp improvement in the productivity has been mainly due to the improvements in the crop varieties and the development of crop husbandry practices.

Horticultural growth has shown wide variation across states. Table 8 provides data on the trends in the area and production of fruits across states. With about 12 million tonnes of production, Andhra Pradesh (excluding Telangana) emerged as the largest producer of fruits in India, followed by Maharashtra and Uttar Pradesh with 10.3 million tonnes each. However, in terms of growth rates, above 10% per year was recorded by Madhya Pradesh (18.6%), Chhattisgarh (16.5%) and Jharkhand (11.3%). Negative growth rates in area were observed in Andhra Pradesh (could be due to separation of Telangana), Maharashtra and Telangana. However, the low performance of Maharashtra in terms of production growth (0.3%) is a cause for concern. However, the state is performing well with respect to productivity growth, as it is well above 4% per year. A close observation reveals that the growth in production as well as area exhibits wide variations. While Uttar Pradesh, Odisha and Bihar registered large productivity growth, it was in negative realms with respect to Chhattisgarh, Jharkhand, and Jammu & Kashmir. Area growth in Chhattisgarh and Jharkhand is not accompanied with productivity growth.

In case of vegetables (Table 9), Uttar Pradesh and West Bengal turned out to be the biggest producers. All the major states have recorded an increase in the area under vegetables except Odisha. Kerala has shown a negative growth in production, could be due to negative productivity growth. The annual growth in area under the vegetables was highest in Chhattisgarh and Madhya Pradesh. The vegetables, in general, has recorded high productivity growth in most of the states, with Chhattisgarh recording a trend growth of 8.2% per year during the period of 2003-04 to 2016-17. The low productivity growth of 0.7% in Uttar Pradesh during the period calls for efforts to increase the productivity in the state. Unlike fruits, the productivity growth of vegetables in Chhattisgarh at about 8.2% per year is noteworthy.

Horticultural sector accounts for about 37% of the total exports of agricultural commodities. Export of horticultural commodities from India has increased 8 times since 2001 to reach ₹ 14856 crore (nominal prices) in 2015-16 (Table 10). Overall exports of horticulture produce have recorded sustained rising trend over past several years (18% per year).Among the commodity groups, fresh onion alone accounts for about 18.5%. The processed products including mango pulp, dried and preserved vegetables and 'other' processed fruits and vegetables together constituted only about 30% of the total export as on 2015-16. This indicated that much of the export is constituted by fresh produce or the products with a relatively low level of processing, highlighting the need to promote processing facilities for horticultural products. Incentivising private sector to start the processing firms bears key to this. Further, the exports need to adhere to international qualities in terms of biological and chemical contaminations and other quality norms. The government, through APEDA and other agencies

Table 9 Growth in area and production of vegetables, across states

States	Area in 2016-17 ('000 ha)	CAGR (2003-04 to 2016-17)	Production in 2016-17 ('000 MT)	Growth rate (2003-04 to 2016-17)
Andhra Pradesh	223.73	1.70	5355.64	5.55
Assam	312.01	1.94	3874.5	2.68
Bihar	844.04	0.30	14225.04	0.97
Chhattisgarh	491.31	12.42	6700.96	20.66
Gujarat	695.84	7.13	13401.39	9.65
Haryana	435.00	5.71	6960.00	7.28
Himachal Pradesh	85.76	3.47	1743.31	5.16
Jammu and Kashmir	62.63	2.71	1386.37	5.58
Jharkhand	286.4	4.86	3714.25	4.38
Karnataka	486.12	2.00	8207.18	5.81
Kerala	137.68	1.03	1907.72	-2.64
Madhya Pradesh	884.05	15.00	16664.66	19.29
Maharashtra	693.15	5.38	10360.76	7.43
Odisha	639.34	0.00	8760.09	1.19
Punjab	230.26	2.82	4640.52	5.08
Tamil Nadu	256.78	2.20	6304.84	3.38
Uttar Pradesh	1400.13	3.02	26407.34	3.71
West Bengal	1387.49	1.27	25500.61	2.86

Source: Indian Horticulture database

Table 10 Level and growth of export of horticultural commodities

Commodity	Value of Export in 2015-16 (₹. Crore)	CAGR from 2001-02 to 2015-16	Share (%)
Floriculture	479.42	7.62	3.23
Fresh onion	2747.41	16.23	18.49
Other fresh vegetable	2119.50	20.73	14.26
Fresh mango	317.10	10.73	2.13
Grape	1551.32	25.56	10.44
Dried and Preserved vegetables	914.21	17.39	6.15
Fruit and vegetable seeds	493.54	17.45	3.32
Mango pulp	796.17	10.34	5.36
Cucumber and Gharkins	999.17	19.87	6.73
Other fresh fruits	1538.16	20.49	10.35
Other processed Fruit and Vegetables	2900.33	22.57	19.52
Total	14856.33	17.78	100.00

Source: APEDA database

have provided laboratory facilities for quality checking and initial handholding.

Compared to exports, the imports are quite low, valued only about ₹ 6622 crores as on 2015-16, constituting about 44% of the total export (Table 11). Imports of horticultural produce have increased two times in terms of quantity and four times in terms of value between 2008 and 2015. Table 11 indicates that excluding onion (import of which is quite volatile), imports have increased for vegetables, fruits and flowers. The domestic demands for exotic fruits and vegetables are quite robust and are on an increase. In order to maintain the positive trade balance in horticulture commodities, India needs to export more of its products, notably in value added form. Setting up of processing facilities and policies to export would have a greater role in this. Development of infrastructure and favourable institutional changes are required to enhance the growth of the sector (Birthal *et al*. 2008).

Export destinations

The analysis indicated that India's export destinations are of narrow base, particularly for fruits and vegetables (Table 12).

The fresh onion and fresh mango exports are highly concentrated to the neighbouring countries. Further, it can be noted that the price realisation is quite low for products with low processing. The low geographical spread of the exports poses challenges and can lead to high volatility. Therefore, there is a need to spread export destinations. This can come only with advanced processing facility. Entrepreneurship development in horticultural processing is to be promoted to achieve this.

Conclusion

Indian agriculture is generally marked with a low profit. Further, the farm income generated is not sufficient to provide a livelihood (Chand *et al* 2011). In this context, to double farmers' income, diversification towards high value horticultural crops is a major strategy. Aggregate data indicates that the area of the horticultural crops is on an increase both at the level and as a share of gross cropped area. The share of high value crops in the total value of output is also on an increase. Of the growth of the value of output from entire agricultural and allied sectors, about one third is by horticultural crops. Increasing income trends has made market for horticultural commodities more widespread and profitable. These high value and nutrition rich commodities are substituting majorly cereals and other

Table 11 Import of Horticulture commodities

Product	2008-09		2015-16	
	Qty (MT)	Value (₹. Crore)	Qty (MT)	Value (₹. Crore)
Other fresh fruits	372679.50	1010.73	685990.8	4208.48
Cocoa products	19083.62	243.21	54116.33	1350.62
Fruits and vegetables seeds	11269.56	241.21	14328.07	703.03
Fresh grapes	12157.05	93.35	5911.66	92.08
Floriculture	3230.86	54.25	4768.81	114.40
Dried and preserved vegetables	1290.37	13.58	4285.99	43.55
Other fresh vegetables	5841.05	7.33	10340.91	17.83
Cucumber and gherkins (Prepared and preserved)	150.60	0.64	22.46	0.24
Mango pulp	27.00	0.15	19.22	0.21
Fresh onions	89.00	0.07	34362.15	92.29
Fresh mangoes	2.32	0.02	0.95	0.01
Total	425820.90	1664.54	814147.34	6622.74

Source: APEDA database

Table 12 Direction and price realization of major horticultural export, across major destinations, 2015-16

Commodity	Country 1	Country 2	Country3	Country 4	Country 5
Floriculture	U S A	Germany	Netherland	U K	UAE
% share in export	23.76	10.61	9.25	10.45	6.58
Unit price realization (₹/kg)	181.65	250.88	262.21	228.48	141.45
Fresh onions	Bangladesh	Malaysia	Sri Lanka	UAE	Nepal
% share in export	33.85	17.50	12.17	11.13	5.09
Unit price realization (₹/kg)	15.80	17.70	17.70	17.50	18.60
Fresh Mangoes	UAE	Saudi Arabia	Kuwait	Qatar	U S A
% share in export	71.36	4.98	1.92	2.20	0.68
Unit price realization (₹/kg)	71.33	67.05	149.68	81.05	253.45
Fresh Grapes	Netherland	U K	Russia	UAE	Saudi Arabia
% share in export	30.89	13.41	12.38	10.40	4.96
Unit price realization (₹/kg)	111.37	122.22	88.92	96.40	87.40

Source: Author's computation based on APEDA database.

food grains with higher value productivity, resulting in higher income to farmers.

The trend analysis has shown wide variation in the growth performance of fruits and vegetables across states. Generally, the productivity growth at all India level is low, which needs to be addressed. The major strategy towards this is by improving the total factor productivity growth, through research and development (Suresh and Mathur 2016). Both public and private sector bears significant role in it. Considering the dominant role of small holders in horticultural production, the public sector research needs to be strengthened to produce improved technology and management practices. The export of the horticultural products are mainly as fresh produce or products with low processing, which leads to lower value realisation. Urgent steps are needed to promote value addition and for entrepreneurship development in processing of horticultural products. The export market requires adherence to prescribed quality norms, for which care needed to be taken in all nodes across the value chain. The current base of the export destination need to be widened, so as to reduce the price volatility, spread risk and expands export volume. The key instrument in development of the horticultural sector would be location specific research and development programmes, development of infrastructure in terms of cold storage, marketing yards and rural roads; and deepening and widening processing facilities.

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