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SUBJECT I
TRIGGERING AGRICULTURAL DEVELOPMENT THROUGH
HORTICULTURE CROPS

Progress and Potential of Horticulture in India

Ramesh Chand, S.S. Raju and L.M. Pandey*

I

INTRODUCTION

The potential of horticulture in raising agricultural production, value added, farm income and employment in the country has been recognised long ago. The Fourth Five Year Plan (1969-74) recognised the importance of this sector. However, the need to raise foodgrain production to secure reasonable availability of staple food was so pressing at that time that promotion of horticulture was considered less important than raising foodgrain production. Besides policy factors, the green revolution technology also favoured wheat and paddy more than any other crop. Towards late 1970s dependence on imports for meeting foodgrain demand almost vanished and a sort of food self sufficiency was in sight. This led to a turnaround in policy towards diversification and area under cereal crops started declining for the first time after 1983-84. However, this diversification did not focus on horticulture alone and it followed in many directions, away from cereals. Diversification towards horticulture got real boost in the early 1990s which coincided with liberalisation of economy. Augmenting facilities for processing, marketing and storage, development of rainfed and irrigated horticulture was one of the objective of new agricultural policy resolution, 1992, (Government of India, 1993). However, the successes achieved in horticulture are not adequately recognised and understood. The general perception is that diversification towards horticulture was export-led. This paper examines the various patterns, trends and successes achieved in diversification towards horticulture since 1970-71 at national and state level with a view to identify the factors underlying its progress and explores further scope for diversification towards horticulture and its role in achieving the target of 4 per cent growth rate in agricultural sector during 11th Plan (Government of India, 2007). The productivity and progress of horticulture is compared with other major crop groups.

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II

DATA AND METHODOLOGY

Horticulture includes a very large number of crops and activities. Some crops like coconut are classified as oilseed and also as horticulture crops. This paper follows crop classification adopted by Central Statistical Organisation (CSO) used in preparing estimates of National Accounts Statistics. This classification contains two exclusive heads which make the bulk of horticulture. These are (a) condiments and spices and (b) fruits and vegetables (including floriculture). Horticulture in this paper is defined as group of crops falling under the above two heads. The paper uses just released 1999-2000 series of CSO on value of output at current prices and at constant prices. While crop group wise value of output is available from CSO since 1950-51, data on area under fruits and vegetables and condiments and spices is available only after 1980-81. Again, there are two estimates of area under fruits and vegetables. One based on land use statistics and the other based on data reported by the National Horticulture Board. We found the area figures based on land use statistics more credible.

III

RESULTS AND DISCUSSION

The Progress and potential of horticulture sector is examined at the national and state levels.

All India Area and Production Trend

During 1980-81 to 1990-91 gross area under cultivation increased by 13 million hectares, whereas area under cereal in the same period declined by one million hectares. This resulted in increase in area under crops other than cereals. The biggest beneficiary of this were oilseed crops. The second biggest beneficiaries were horticulture crops. The area under fruits and vegetables increased by 2 million hectares and area under condiments and spices increased by 0.5 million hectares. These increases in area raised the share of horticulture crops in total cropped area from 4 per cent in 1980-81 to 5.1 per cent in 1990-91. Horticulture crops, particularly fruits and vegetables, witnessed further significant increase in area during 1990s even though there was no increase in gross cropped area in this period. As a result, the share of horticulture crops reached almost 6 per cent of the total cropped area of the country by 2000-01 (Table 1).

TABLE 1. ALL INDIA AREA SHARE BY CROP GROUPS

Crop group (1)	Area (million ha)				Area share (per cent)			
	1980-81 (2)	1990-91 (3)	2000-01 (4)	2005-06 (5)	1980-81 (6)	1990-91 (7)	2000-01 (8)	2005-06 (9)
Cereals	104.2	103.2	100.7	99.2	60.4	55.6	54.2	52.2
Pulses	22.5	24.7	20.4	22.4	13.0	13.3	11	11.8
Oilseeds	17.6	24.2	22.8	27.9	10.2	13.0	12.3	14.7
Sugarcane	2.7	3.7	4.3	4.2	1.5	2.0	2.3	2.2
Cotton	7.8	7.4	8.5	8.7	4.5	4.0	4.6	4.6
Horticulture	7.0	9.5	11.0	12.4	4.0	5.1	5.9	6.5
(a) Condiments and spices	2.1	2.6	2.8	3.1	1.2	1.4	1.5	1.6
(b) Fruits and vegetables	4.9	6.9	8.2	9.3	2.8	3.7	4.4	4.9
Others	10.9	13.2	18.1	15.3	6.3	7.1	9.7	8.1
All crops	172.6	185.7	185.7	190.1	100	100	100	100

Sources: 1. *Agricultural Statistics at a Glance 2007*, Ministry of Agriculture, Government of India, New Delhi.
2. *Land Use Statistics*, Ministry of Agriculture, Government of India, New Delhi.

The area share of different crop groups reveal that crop pattern in India during the 1980s diversified in favour of horticulture, oilseeds and cash crops like sugarcane. Economic reforms and policies adopted since 1990-91 further increased the pace of diversification in favour of horticulture crops. According to the land use statistics horticulture crops are now grown on more than 12 million hectares area as compared to 7 million hectares during 1980-81. More than three-fourth of this area is under cultivation of fruits and vegetables.

The main factor underlying diversification in favour of fruits and vegetables has been higher return relative to other crop groups. This can be seen from Table 2 which shows per hectare value of output of different crop groups at current and constant prices. During 1980-81 per hectare productivity of cereals, pulses, oilseeds and cotton was below Rs.10,000 at 1999-2000 prices while sugarcane and condiments and spices provided gross return of around Rs. 33.5 thousand.

TABLE 2. ALL INDIA PRODUCTIVITY OF CROP GROUPS

Crop group (1)	At 1999-2000 prices		(Rs./ha)
	1980-81 (2)	2005-06 (3)	2005-06 (4)
Cereals	7,779	13,381	15,042
Pulses	6,384	8,015	9,818
Oilseeds	8,221	13,665	16,891
Sugarcane	33,921	38,567	45,945
Cotton	8,717	21,627	20,438
Horticulture	69,829	95,379	1,14,883
(a) Condiments and spices	33,383	68,141	50,540
(b) Fruits and vegetables	86,072	1,04,015	1,35,876
All Crops	13,214	22,129	26,011

Sources: 1) Same as in Table 1.
2) *National Accounts Statistics*, Central Statistical Organisation, Government of India, New Delhi (various issues).

Fruits and vegetables were far ahead with per hectare value of output at Rs. 86 thousand. The next two decades witnessed increase in productivity of all crop groups but absolute gains were much larger for horticultural crops. There is some slowdown in productivity growth of all crop groups after 2000-01 but the change is negative for fruits and vegetables. Per hectare productivity of fruits and vegetables at 1999-2000 prices declined from Rs. 1.12 lakh to Rs 1.04 lakh. Though still fruits and vegetables are about five times more productive compared to other crops, there is a need to address the decline in productivity. Productivity advantage for fruits and vegetables is much higher at current prices as compared to constant prices. For instance, productivity of fruits and vegetables is 4.7 times the average crop productivity at 1999-2000 prices and more than five times at current prices. Reverse is true for condiments and spices. The implication of this is that among various crop groups, fruits and vegetable prices are rising faster and condiments and spices prices are rising slower than average prices of crop sector.

The total impact of increase in productivity and area is reflected in total production. Decade wise growth rate in production (value of output at 1999-2000 prices) since 1970-71 is presented in Table 3.

TABLE 3. ALL INDIA CROP GROUP WISE GROWTH IN PRODUCTION

Crop group (1)	<i>(per cent)</i>			
	1970-71 to 1979-80 (2)	1980-81 to 1989-90 (3)	1990-91 to 1999-2000 (4)	1996-97 to 2005-06 (5)
Cereals	2.66	2.89	2.24	0.13
Pulses	-0.01	1.54	0.84	-0.20
Oilseeds	1.11	5.15	1.92	0.64
Sugarcane	2.26	2.19	2.74	3.67
Cotton	2.61	2.57	2.68	2.40
Horticulture	2.88	2.64	5.84	3.12
(a) Condiments and spices	2.90	4.71	4.97	4.25
(b) Fruits and vegetables	2.88	2.27	6.00	2.91
All Crops	1.79	2.03	3.02	1.66

Source: Same as in Table 2.

Output of horticulture, both condiment and spices and fruits and vegetables, increased at much faster rate as compared to growth rate of total crops sector during all the decades since 1970-71. Second, the growth rate in horticulture group was higher than all other crop groups except cereals and oilseeds during 1980-81 to 1989-90. Horticulture production increased by about 2.9 per cent per year during 1970s when annual growth rate of total crop sector was 1.8 per cent. There was some setback to growth rate of fruits and vegetables during 1980s however growth rate in condiment and spices accelerated to 4.7 per cent.

Horticulture production received a strong boost during 1990s (Chand *et al.*, 2007). Growth rate in output of fruits and vegetables reached 6 per cent and condiments and spices reached almost 5 per cent. Those high growth rates in output of horticulture helped in raising growth rate of total crop sector from 2.03 per cent during 1980s to 3.02 per cent during 1990s despite deceleration in growth rates of cereals, pulses and oilseeds which comprise more than half of the output of crop sector till 1990-91 (Table 3).

High growth rate during 1990s raised the share of horticulture crops in total crop output to almost 29 per cent. The share was below 20 per cent during 1990-91. Thus, 10 years period between 1990-91 and 2000-01 raised the share of horticulture by 9 percentage points which is a spectacular achievement (Table 4).

TABLE 4. ALL INDIA CROP GROUP'S SHARE IN PRODUCTION AT CURRENT PRICES

Crop group (1)	<i>(per cent)</i>				
	1970-71 (2)	1980-81 (3)	1990-91 (4)	2000-01 (5)	2005-06 (6)
Cereals	43.14	37.20	34.55	32.84	30.18
Pulses	5.35	6.41	6.80	4.55	4.45
Oilseeds	9.62	8.43	12.99	6.92	9.52
Sugarcane	3.91	5.66	4.80	4.60	3.90
Cotton	4.01	3.58	3.68	2.58	3.59
Horticulture	17.11	17.90	19.76	28.94	28.81
(a) Condiments and spices	2.42	1.95	2.58	3.59	3.20
(b) Fruits and vegetables	14.69	15.95	17.18	25.35	25.61
Others	16.86	20.82	17.41	19.57	19.56
All Crops	100	100	100	100	100

Source: Same as in Table 2.

High growth rate of horticulture witnessed during 1990s could not be sustained in the recent years because of slowdown in growth of fruits and vegetables. The growth rate during 2000-01 to 2005-06 turned out to be less than 1 per cent (0.73 per cent per year). One could say that trend growth rate based on short period of 5 years is highly subject to good or bad performance of one year particularly of base year and terminal year. To overcome this problem and to ascertain the truth about decline in growth we have presented growth rates for last 10 years which is also consistent with length of the earlier period. This shows that growth rate in output of fruits and vegetables during 1996-97 to 2005-06 is less than half of the growth rate for 1990-91 to 1999-2000. Further analysis of the series confirm serious slowdown in horticultural output owing to slowdown in output of fruits and vegetables from 2001-02 onwards.

The slowdown has afflicted almost all segments of agriculture and in some crop groups the growth rate is close to zero. Some segments have been adversely hit by slowdown in productivity, some by decline in prices and some by both.

It is pertinent to mention that despite slowdown in growth rate, the share of fruits and vegetables show small increase in their share in total output of crop sector at

current prices. The share of different crop groups in value of total crop output show significant changes which are largely consistent, but more pronounced, in diversification in area (Table 4). Some important changes witnessed during 1980-81 to 2005-06 that are worth mentioning are (a) the share of fruits and vegetables in area increased from 2.8 to 4.9 per cent and their share in crop output increased from 15.95 per cent to 25.61 per cent (b) share of cereals in area declined from 60.4 per cent to 52.2 per cent and in output from 37.2 per cent to 30.2 per cent.

State wise Trend in Area and Output of Horticulture

Among major states, fruits and vegetables were grown on more than 10 per cent area in Kerala, Orissa and West Bengal during 1990-91 (Table 5). Almost all states except Haryana witnessed increase in area share of fruits and vegetables in total cropped area during 1990-91 to 2005-06. Diversification in favour of fruits and vegetables was quite rapid in Tamil Nadu, Andhra Pradesh, Maharashtra, Karnataka and Gujarat. The area share of fruits and vegetables increased from 4 per cent to 7.2 per cent in Andhra Pradesh, 2.3 per cent to 5.0 per cent in Maharashtra, 1.8 per cent to 3.5 per cent in Gujarat, 2.3 per cent to 4.3 per cent in Karnataka, and 5.4 per cent to 9.4 per cent in Tamil Nadu. Fruits and vegetables occupy less than 1 per cent area in Haryana and Rajasthan and below 2 per cent in Punjab and Madhya Pradesh. Diversification towards horticulture is found very slow in Bihar and Uttar Pradesh.

TABLE 5. SHARE OF MAJOR STATES IN ALL INDIA AREA AND PRODUCTION OF FRUITS AND VEGETABLES

State (1)	Area		Value of output (per cent)	
	1990-91 (2)	2005-06 (3)	1990-91 (4)	2005-06 (5)
Andhra Pradesh	8.12	9.61	4.67	6.75
Assam	3.22	3.10	3.59	2.45
Bihar	6.83	5.44	9.23	10.02
Gujarat	2.96	4.12	2.81	4.45
Haryana	0.96	0.64	0.92	1.36
Himachal Pradesh	1.12	1.09	1.37	1.94
Jammu and Kashmir	0.93	0.83	6.01	2.06
Karnataka	4.19	5.89	10.57	6.57
Kerala	8.86	6.42	7.81	4.76
Madhya Pradesh	3.35	3.72	3.56	4.50
Maharashtra	7.83	12.02	10.83	13.84
Orissa	15.37	10.46	5.90	5.83
Punjab	1.29	1.62	1.93	1.72
Rajasthan	1.16	1.31	0.63	0.47
Tamil Nadu	5.52	5.96	5.72	5.03
Uttar Pradesh	13.37	10.99	8.80	10.43
West Bengal	13.44	13.92	13.20	14.82
Others	1.50	2.84	2.45	3.00
All India	100	100	100	100

Source: Same as in Table 2.

Due to very high value of output per unit of area, the share of fruits and vegetables in value of output is much higher than area share. The most notable achievement in this is recorded in Andhra Pradesh where the share of fruits and vegetables in value of output more than doubled between 1990-91 and 2005-06. Fruits and vegetables constitute more than half of total value of crop sector in the hill states of Himachal Pradesh and Jammu and Kashmir. In Orissa and West Bengal the share of fruits and vegetables is around 46 per cent. Fruits and vegetables constitute less than 10 per cent of value of crop output in Haryana, Punjab and Rajasthan. It is important to mention that despite lot of talk about arid horticulture, the share of fruits and vegetables in Rajasthan remains below 2.5 per cent. Similarly, various efforts to promote horticulture as an alternative to rice-wheat cropping system in north west India is not making significant progress.

The share of different states in all India area and value of output of fruits and vegetables is presented in Table 6. Between 1990-91 and 2005-06 the share of Andhra Pradesh and Maharashtra in all India area increased significantly. In contrast the share of Orissa, Kerala and Uttar Pradesh showed a sharp decline. The performance of West Bengal has been quite stable. West Bengal is now one of the top producers with 14.8 per cent share in all India production followed by Maharashtra. Uttar Pradesh and Bihar contributes 10 per cent of fruits and vegetables production of India. These four states together contributed almost half of total fruits and vegetables in the country. The share of Andhra Pradesh, Karnataka, Tamil Nadu and Orissa in all India production ranges between 5 and 7 per cent.

TABLE 6. SHARE OF FRUITS AND VEGETABLES IN AREA AND OUTPUT OF CROP SECTOR IN MAJOR STATES

State (1)	<i>(per cent)</i>					
	Area			Value of output		
	1990-91 (2)	2000-01 (3)	2005-06 (4)	1990-91 (5)	2000-01 (6)	2005-06 (7)
Andhra Pradesh	3.99	6.28	7.16	10.16	16.11	22.50
Assam	5.48	7.13	7.66	26.68	27.27	30.41
Bihar	4.22	5.10	5.14	28.13	44.87	52.46
Gujarat	1.81	2.70	3.47	10.69	18.16	17.48
Haryana	1.05	0.96	0.93	4.38	9.89	9.49
Himachal Pradesh	7.39	9.69	10.37	40.99	56.82	59.40
Jammu and Kashmir	5.63	6.01	6.99	67.84	55.42	57.63
Karnataka	2.31	3.77	4.29	28.90	30.98	25.59
Kerala	19.01	20.05	19.99	38.67	32.07	37.82
Madhya Pradesh	0.91	1.22	1.34	7.51	18.68	15.32
Maharashtra	2.32	3.33	5.01	21.42	29.82	28.43
Orissa	10.39	7.83	11.18	27.64	46.29	45.83
Punjab	1.11	1.90	1.87	6.32	4.29	8.08
Rajasthan	0.39	0.50	0.58	1.82	3.56	2.38
Tamil Nadu	5.40	8.41	9.44	21.07	26.87	30.58
Uttar Pradesh	3.40	3.72	3.96	10.29	18.92	17.25
West Bengal	10.06	13.82	13.81	31.83	46.44	47.34
All India	3.49	4.36	4.88	18.04	25.44	25.76

Source: Same as in Table 2.

Growth rate in production of fruits and vegetables has seen significant slowdown in some states, while, there is sharp acceleration in selected states after 1990-2000. Maharashtra, which is considered as fast horticulture growing state maintained more than 5.5 per cent growth rate and Andhra Pradesh has seen acceleration in growth rate from 4 to about 5 per cent. The last six years show rapid progress in production of fruits and vegetables in Gujarat, Himachal Pradesh and Chhattisgarh, exceeding 10 per cent annual rate of increase. Growth rate turned out to be either negative or very low in Assam, Karnataka, Rajasthan, West Bengal and Uttarakhand. Even after formation of new states, horticulture do not seem to be making significant progress in Uttarakhand (Table 7).

TABLE 7. TREND GROWTH RATE IN OUTPUT OF FRUITS AND VEGETABLES IN MAJOR STATES

State/U.Ts (1)	<i>(per cent)</i>		
	1990-91 to 1999-2000 (2)	1999-2000 to 2005-06 (3)	1990-91 to 2005-06 (4)
Andhra Pradesh	4.06	4.96	4.85
Assam	3.87	-6.38	1.08
Bihar (Old)	8.80	4.54	10.95
Bihar(New)	N.A.	3.51	N.A.
Gujarat	3.49	14.35	7.19
Haryana	15.26	4.57	12.07
Himachal Pradesh	3.80	16.45	7.03
Jammu and Kashmir	1.67	3.54	3.82
Karnataka	0.54	-4.75	1.22
Kerala	2.23	0.77	0.89
Madhya Pradesh (Old)	4.89	3.54	5.80
Madhya Pradesh (New)	N.A.	-1.40	N.A.
Maharashtra	5.89	5.76	5.02
Orissa	4.40	1.84	5.41
Punjab	5.57	7.64	4.58
Rajasthan	12.68	-1.19	6.25
Tamil Nadu	8.65	1.52	4.98
Uttar Pradesh (Old)	8.25	0.96	6.57
Uttar Pradesh (New)	N.A.	0.90	N.A.
West Bengal	8.04	1.87	4.31
Jharkhand	N.A.	9.24	N.A.
Chhattisgarh	N.A.	11.14	N.A.
Uttarakhand	N.A.	1.57	N.A.
All India	5.97	2.13	4.57

Source: Same as in Table 2.

Domestic Demand Prospects and Trade

Demand side prospects of horticulture crops can be captured from trend in domestic consumption and trade. National Sample Survey (NSS) data shows that

consumption of fruits and vegetables is rising at a faster rate as compared to other food. Recent data from 61st Round of NSSO for the year 2004-05 shows that the share of fruits and vegetables in total food expenditure has increased in both rural and urban areas (Table 8). As rural diets are catching up with urban diets, the increase in share of fruits and vegetables is found to be much higher than that in urban areas. Rural consumers spent 14.5 per cent of their total food expenditure during 2004-05 on fruits and vegetables as compared to 12.32 per cent during 1993-94. In urban area the share increased from 14.86 per cent to 15.76 per cent.

TABLE 8. SHARE OF MONTHLY PER CAPITA EXPENDITURE OF FRUITS AND VEGETABLES

Particulars (1)	Year (2)	Rural (3)	Urban (4)
Per capita expenditure (Rs.)			
Total Food	1993-94	177.8	250.3
	2004-05	307.6	447.4
Fruits and vegetables	1993-94	21.9	37.2
	2004-05	44.5	70.5
Share of fruits and vegetables in total food expenditure (per cent)			
	1993-94	12.32	14.86
	2004-05	14.47	15.76

Source: NSSO Report No.509: *Household Consumption of Various Goods and Services in India, 2004-05*.

Fruits and vegetables produced in India are believed to have great potential for export. During the last 11 years export of fresh fruits and vegetables and processed fruits and vegetables has witnessed very sharp increase, while imports also increased. There is a need to know whether balance of net trade has gone in favour of export or in favour of import.

The information given in Table 9 indicates that import of fresh fruits and nuts in India increased at a much faster rate than export of fresh fruits. Import of fresh fruits and nuts during 2006-07 exceeds exports by more than \$120 million or Rs. 500 crore. India imports cashew nut and re-export them after processing. Comparable data on

TABLE 9. TRADE IN IMPORTANT HORTICULTURAL PRODUCTS

Year (1)	<i>(US \$ million)</i>					
	Import	Export				Net export
	Fruits and nuts excluding cashew nut (2)	Fresh Fruits (3)	Fresh vegetables (4)	Processed veg./ fruit juice (5)	Fruit/ veg. Seed (6)	Cashew nut (7)
1995-96	65	69	89	104	12	226
2000-01	175	85	100	172	14	239
2001-02	159	87	121	149	13	286
2002-03	133	92	133	172	20	171
2003-04	175	171	208	138	12	72
2004-05	245	192	192	163	15	152
2005-06	314	253	208	247	21	114
2006-07	452	329	356	317	27	162

Source: Computed from various issues of *Agricultural Statistics at a Glance*.

import of other items like fresh vegetables and processed fruits and vegetables is not readily available to find out whether India is emerging as a net exporter or net importer of these items. The net export of cashew nut though fluctuates show declining trend which again indicate rising domestic demand.

Import of fresh fruits and nuts has increased despite moderate to high import duties. It is now common to find imported fruits like apple, pear, kiwi, being sold along with Indian fruits. These sales of imported fruits are not limited to coastal areas – imported fruits are now common even in the distant market in north India. These trends indicate high purchasing power of India's consumers and their preference for quality, variety, and all season consumption. Fascination for export sometimes overlook the potential of domestic demand. It is good to be enamoured by export, but the domestic market seems to be offering very large potential for promoting horticulture production in the country.

IV

CONCLUSIONS

India started experiencing diversification in crop production away from cereals around 1983-84. However, this diversification did not focus on horticulture alone and it followed in many directions. Diversification towards horticulture got real boost in the early 1990s which coincided with liberalisation of economy. The growth rate in output of fruits and vegetables reached 6 per cent and condiments and spices reached almost 5 per cent. Those high growth rates in output of horticulture helped in raising growth rate of total crop sector from 2.03 per cent during 1980s to 3.02 per cent during 1990s despite deceleration in growth rates of cereals, pulses and oilseeds which comprise more than half of the output of crop sector till 1990-91.

The main factor underlying diversification in favour of fruits and vegetables has been higher returns relative to other crop groups and the difference in productivity between horticulture and other crops have been widening during 1980-81 to 2000-01. During 1980-81 to 2005-06 the share of fruits and vegetables in total cropped area of the country increased from 2.8 to 4.9 per cent and their share in crop output increased from 15.95 per cent to 25.61 per cent. There is some slowdown in productivity growth of all crop groups after 2000-01 but the change is negative for fruits and vegetables. Even though productivity of fruits and vegetables is about five times the productivity of other crops, there is a need to address the decline in productivity of fruits and vegetables.

Among states, Maharashtra, maintained more than 5.5 per cent growth rate and Andhra Pradesh has seen acceleration in growth rate from 4 to about 5 per cent between 1990s and 2000s. The last six years show rapid progress in the production of fruits and vegetables in Gujarat, Himachal Pradesh and Chhattisgarh, exceeding 10 per cent annual rate of increase. Growth rate turned out to be either negative or very low in Assam, Karnataka, Rajasthan, West Bengal and Uttarakhand.

Domestic demand for horticultural products, particularly fruits and vegetables is rising rapidly throughout the country. This is giving sharp rise to import which exceeds export in major items like fresh fruits. While emphasis on export for promoting horticulture is genuine there is a vast scope for import substitution by improving crop production and efficiency.

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