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Growth trends of Horticulture Crops in India

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Abstract
The growth of horticulture crops has become one of the driving forces for overall development of agricultural sector in India. With the emergence of urbanization and modernization, changes in cropping pattern from traditional to high value cash crops, especially the horticultural crops has been initiated in Indian agriculture. Horticulture is perhaps the most profitable venture of all farming activities as it provides ample employment opportunities and scope to raise the income of the farming community. It also has tremendous potential to push the overall agriculture growth to more than the targeted 4 per cent. It is the fastest growing sector within agriculture. It contributes in poverty alleviation, nutritional security and have ample scope for farmers to increase their income and helpful in sustaining large number of agro-based industries which generate huge employment opportunities. Keeping these understandings in mind, the present study estimates growth rates and value of output of the major agricultural crops, including the horticultural crops. The study reveals that the growth of area, production and yield of horticulture crops in the country was found to be statistically significant. Within the greater horticulture sector, the value of output for fruits and vegetables was found to be at the highest, accounted for 26 per cent of the total agricultural value of output. However, despite impressive output growth, the yield growth rate of fruit crop was found to be statistically insignificant.

Keywords: horticulture, trend of horticulture produce, NHM, growth, India

Introduction
Agriculture plays a vital role in the Indian economy. Over 70 per cent of the rural households depend on agriculture as their principal means of livelihood. The total Share of Agriculture and allied Sectors in terms of percentage of GDP is 13.9 per cent during 2013-14 at 2004-05 prices. (Estimates released by Central Statistics Office). Horticulture is a part of agriculture, which is concerned with the cultivation of "garden crops" and can be defined as the branch of agriculture concerned with intensively cultured plants directly used by peoples for food, for medicinal purpose or for aesthetic gratification (Singh 2012) [11]. Horticulture includes cultivation of fruits, nuts, vegetables, medicinal and aromatic plants, flowers, etc. Importance of horticulture lies in the fact that it generates much income per hectare of land as compared to other agricultural crops facilitates employment, food and nutritional security and industrialization too. The growth in the production of fruits and vegetables assumes critical importance nowadays due to the increase in the demand generated by the rapid increase in population and has been accelerated by the rise in the levels of income of the people and the consequent changes in the pattern of consumption. Fruits play a unique role in developing countries like India both in economic and social sphere for improving income and nutritional status particularly of rural masses.

India is the second largest producer of vegetables and fruits after China and is popularly known as Fruits and Vegetable Basket of the world (Gandhi & Nambordiri, 2002). India has started putting greater thrust on the development of horticultural sector after sixties in order to exploit the country's vast potential and to generate the much needed value addition. In 2010-11 horticultural crops put together covered approximately 11.35% of the total cropped area with an annual production of about 114 million tons accounting for more than 18% of agricultural output of India (Das, Gogoi and Borah, 2013) [3]. The importance of horticulture in improving the productivity of the land, generating employment, improving economic conditions of the farmers and entrepreneurs, enhancing exports and above all, providing nutritional security to the desert dwellers, can hardly be overemphasized (Bhandari *et al.,* 2014) [1].

Objectives
1) To analyse the growth trends of area, production and productivity of horticultural crops.
2) To identify the effects through which the production of horticulture crops has increased in the recent past, in India.
3) To analyse the role of horticulture in the development of Agriculture.

Methodology
The data has been obtained from official websites and official records & documents; such as National Horticulture Board (NHB), Agricultural and Processed Food Products Export Development Authority (APEDA), Handbook of Horticulture, Statistical Year Book and others. Different Books, Reports, and Research Papers have been consulted to generate the idea and of literature available. Statistical techniques and tools like trend analysis, Percentages, Growth rates have been applied in drawing results and analysis of data.

Results and Analysis
Figure 1. Shows the trends of total area and production of horticultural crops. Total area under horticultural crops has increased from 16,592 thousand hectares of 2001-02 to 24,198 thousand hectares in the year 2013-14. Similarly, total

horticultural production increased to 2,77352 thousand metric tons in 2013-14 from 1,45785 thousand metric tons of 2001-02. But in the year 2002-03 total horticultural area decreased from 16,592 thousand hectares of the year 2001-02 to 16,270 thousand hectares. Total area under horticultural crops, which was 19,208 thousand hectares in 2003-04 decreased to 18,445 thousand hectares in the year 2004-05, while overall production decreased only once in the year 2002-03 from 1,44380 thousand metric tons of the year 2001-02 to 14,578 thousand metric tons (2002-03), which is a slight downfall of the production of horticulture production.

Fruits, vegetables and plantation crops are the major component of horticultural crops. Besides these, flowers and nuts are also important. Analysis (of Table 1. and Table 2.) shows that vegetables ranks first in terms of both area and production among all horticultural crops from the year 2001-02 to 2013-14; while the fruits are positioned on the second. Plantation crops ranks third in area and production terms. Area of fruits was 4,010 (2001-02) thousand hectares which increased to 7,216 thousand hectares in the year 2013-14. Vegetables show a prominent growth in a real terms and the area under vegetables increased to 9,396 thousand hectares in 2013-14 from 6,156 thousand hectares in 2001-02. Area of flowers has been doubled during the study period from 106 thousand hectares (2001-02) to 255 thousand hectares in 2013-14. Area of aromatic and medicinal crops rose heavily from 131 thousand hectares in 2004-05 to 557 thousand hectares in 2012-13, but in 2013-14 it fell down to 493 thousand hectares. Whereas nuts, have shown limited growth in terms of area during the study period, and has been included in fruits from the year 2010-11onwards. Area under spices decreased during the study period as it was 3,220 thousand hectares in 2001-02 and decreased to 3,163 thousand hectares in 2013-14. (Table 1.)

There is a tremendous growth in the production statistics of horticulture crops in India from 2001-02 production of fruits has increased from 43,001 thousand metric tons to 88,977 thousand metric tons in 2013-14 which is a double increase. Similarly production of vegetables has followed the same trend. Production of vegetables has increased from 88,622 thousand metric tons to 1,62,897 thousand metric tons in the study period from 2001-02 to 2013-14. Flower production rose 4.2 times, as it was only 535 thousand metric tons in 2001- 02 and become 2,297 thousand metric tons in 2013-14. Production of plantation crops increased from 9,697 thousand metric tons to 16,301 thousand metric tons in the study period. Spices showed a growth of 1.5 times in production between the years 2001-02 to 2013- 14 in spite of decreased area. (Table2)

Table 3. Shows that growth in the horticultural area was highest in the year 2003-04 which is about 18.1 per cent; while production growth was highest in 2007-08 about 10.1 per cent. Highest productivity was in the year 2009-10 which was 10.7 metric tons/ha while the lowest is 8.0 metric tons/ha in 2003-04.

Table 5. Shows the share of output of horticulture crops with percentage share in agriculture. The share of fruits and vegetable is very high, and is increasing. In the year 2008-09 the share of fruits and vegetables was 24.5 per cent in total horticulture and share of horticulture in overall agriculture sector was 31.1 per cent. In the year 2009-10 the share of horticulture was 31.7, but in the year 2010-11 the contribution of horticulture has declined little and was recorded as 29.5 per cent. Horticulture sector is contributing about 30 per cent to overall agriculture output, especially fruits and vegetables which are the backbone of horticulture. So there is a vast scope for this sector.

Table 6. Shows the crop wise area, production and productivity of horticulture crops in India from last three year. Production of Banana in fruits for all the three years is very high. In 2013-14 production of Banana was 29725 Thousand MT and area of the Banana was 803 Thousand Hectares. Productivity of banana was 37 Thousand MT per hectare for the year 2013-14 which is high as compared to other crops. In vegetables the share of potatoes is 41555 Thousand MT and area of potatoes was 1973 Thousand Hectares in the year 2013-14. Highest productivity for any horticulture crop in India is Papaya with 42.3 Thousand MT per hectare followed by Tapioca (35 Thousand Hectares), Banana (37 Thousand Hectares), Cabbage (226 Thousand Hectares) and Apple (21.8 Thousand Hectares). Total production of all horticulture crops was 268847 Thousand MT in the year 2012-13 and total area in the same year was 2369 Thousand Hectares which increased to 277352 Thousand MT and 2419 Thousand Hectares in the year 2013-14.

Table 7. Shows the percentage share of horticulture crops in total horticulture for last three years. The main contributors to horticulture sector are fruits and vegetables contributing 90.8 per cent of total horticulture production, among fruits and vegetables 58.73 per cent share comes from vegetables in the year 2013-14. Share of fruits was 32.08 per cent to total horticulture production of India for the year 2013-14. Share of plantation crops was 5.88 per cent in the year 2013-14. Similarly share of spices was 2.13 per cent and share of flowers (including cut flowers and loose flowers) and aromatics was 1.15 per cent in the year 2013-14. Among all crops the share fruits is increasing year after year and share of vegetables is declining.

Table 8. Shows the production of horticulture with respect to food grains. As data clearly shows that, total horticultural production has surpassed the foodgrain production in India. In the year 2013-14 total foodgrain production of India was 266.57 MT and total horticulture production in the same year was 280.79 MT which is quite higher than that of food grains. From the year 2011-12 horticulture production has overtaken the foodgrain production in India, which is a positive sign for horticulture sector. From 2011-12 to 2013-14 production of horticulture is dominating the foodgrain production in India.

Table 9. Shows the total value of India's horticultural exports in 2014-15 was Rs 13,82281lakh (nearly $2.8 billion). Despite being the world's second-largest producer of fruits and vegetables, India accounted for just 0.36% and 1.03% of exports, respectively, in terms of value, in 2012. Overall horticultural exports from India to rest of the world is increasing year by year. Processed fruits and vegetables, accounts Rs 256991.89 lakh in the year 2014-15. The percentage share of onions in the year 2014-15 is 1.75 per cent followed by cucumber (0.92 per cent) and grapes (0.83 per cent) in the year 2014-15 respectively. Total exports of all horticulture commodities have increased from 1059403 lakh INR in the year 2012-13 to 1,436488 lakh INR in the year 2013-14.

The government of India has launched several schemes for the development of horticulture sector in the country. The main

step taken by the government was the introduction of National Horticulture Mission

National Horticulture Mission (NHM)

National horticulture mission was launched during the year 2005-06 to provide a thrust to the development of horticulture in the country. It is a centrally sponsored scheme in which government of India contributes 85% and 15% is met by the state governments. For its successful implementation mission is divided into three levels: 1) National level 2) State level and 3) District level**.**

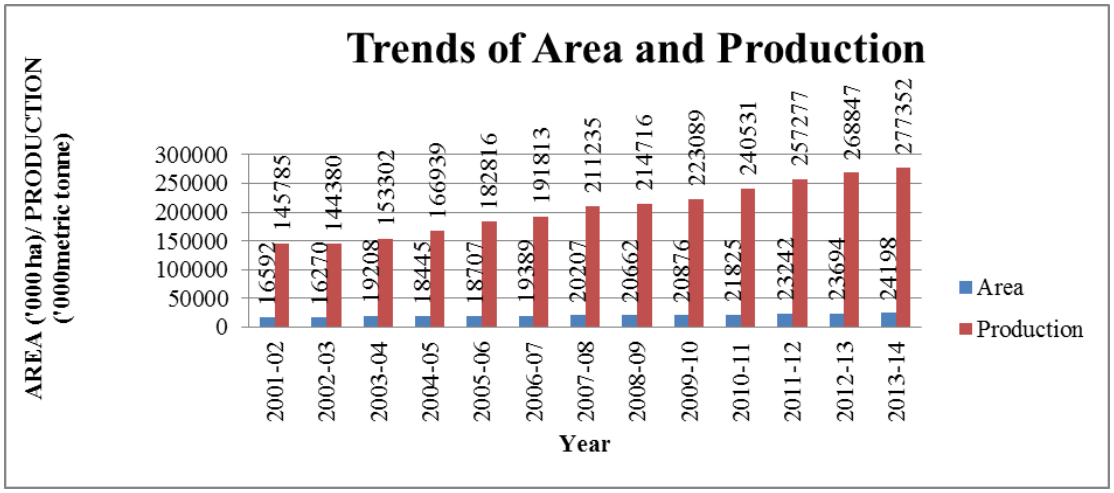
NHM Objectives

The main objectives of the Mission are:

1) To provide holistic growth of the horticulture sector through an area based regionally differentiated strategies which include research, technology promotion, extension, postharvest management, processing and marketing, in consonance with comparative advantage of each State/region and its diverse agro-climatic feature;
2) To enhance horticulture production , improve nutritional security and income support to farm households;
3) To establish convergence and synergy among multiple on-going and planned programs for horticulture development;
4) To promote, develop and disseminate technologies, through a seamless blend of traditional wisdom and modern scientific knowledge;
5) To create opportunities for employment generation for skilled and unskilled persons, especially unemployed youth;

Conclusion and Suggestions

The horticulture sector has become one of the driving forces for overall development of agriculture sector. Its products have more demand in local, national and international markets. It occupies an important position in terms of providing livelihood options, meeting the required amount of demand for food and nutritional security. The study reveals that there is positive relationship between area and production of horticulture crops in India and there is also a positive, significant and high relationship between horticultural production and horticulture exports in the country compared to other combinations of variables. In order to reduce the imports from abroad, to boost the area under the cultivation of horticulture crops and productivity through adopting modern technology is a pre-condition in Indian horticulture sector, to overcome this phenomenon. Despite significant growth in production, the yield growth rate of fruit was not very impressive. Therefore, it calls for technological innovation in the sector. On the policy side, as the issues of environmental degradation, sinking of arable land and urbanization have been at the forefront of national debate now, more emphasis should be given to enhance the yield level with the help of innovations and technology. Secondly, to enhance production and meet ever increasing demand of horticulture crops, cultivable waste lands of the bigger States could be brought under horticulture cultivation. Thirdly, the problem of storage should be solved by setting up more and more warehouses and cold storages facilities in all districts and sub districts in the country.



***Source*:** NHB Database, 2014

Fig 1: Trends of Total Area and Production of Horticultural Crops; (2001-02 to 2013-14)

Table 1: Area Under Various Horticultural Crops (in '000 ha); (2001-02 to 2013-14)

Year	Fruits	Vegetables	Flowers	Nuts (Almond & Walnut)	Aromatic & Medicinal	Plantation crops	Spices	Grand total
2001-02	4010	6156	106	117	NA	2984	3220	16592
2002-03	3788	6092	70	117	NA	2984	3220	16270
2003-04	4661	6082	101	106	NA	3102	5155	19208
2004-05	5049	6744	118	106	131	3147	3150	18445
2005-06	5324	7213	129	130	262	3283	2366	18707
2006-07	5554	7581	144	132	324	3207	2448	19389
2007-08	5857	7848	166	132	397	3190	2617	20207
2008-09	6101	7981	167	136	430	3217	2629	20662
2009-10	6329	7985	183	142	509	3265	2464	20876
2010-11	6383	8495	191	I F*	510	3306	2940	21825

2011-12	6705	8989	254	I F*	506	3577	3212	23242
2012-13	6982	9205	233	I F*	557	3641	3076	23694
2013-14	7216	9396	255	I F*	493	3675	3163	24198

***Source*:** NHB Database, 2014
***Included in fruits**

Table 2: Production of Various Horticultural Crops (in '000 metric tons); (2001-02 to 2012-13)

Year	Fruits	Vegetables	Flowers	Nuts (Almond & Walnut)	Aromatic & Medicinal	Plantation crops	spices	Mushroom	Honey	Grand Total
2001-02	43001	88622	535	114	NA	9697	3765	40	10	145785
2002-03	45203	84815	735	114	NA	9697	3765	40	10	144380
2003-04	45942	88334	580	121	NA	13161	5113	40	10	153302
2004-05	50867	101246	659	121	159	9835	4001	40	10	166939
2005-06	55356	111399	654	149	202	11263	3705	35	52	182816
2006-07	59563	114993	880	150	178	12007	3953	37	51	191813
2007-08	65587	128449	868	177	396	11300	4357	37	65	211235
2008-09	68466	129077	987	173	430	11336	4145	37	65	214716
2009-10	71516	133738	1021	193	573	11928	4016	41	65	223089
2010-11	74878	146554	1031	In fruits	605	12007	5350	41	65	240531
2011-12	76424	156325	1652	In fruits	566	16359	5951	NA	NA	257277
2012-13	81285	162187	1729	In fruits	918	16985	5744	NA	NA	268847
2013-14	88977	162897	2297	In fruits	895	16301	5908	NA	76	277352

***Source*:** NHB Database, 2014

Table 3: Annual Area, Production and Productivity Growth Trends of Total Horticultural Crops); (2001-02 to 2013-14)

Year	Area	Production	%Growth in Area	%Growth in Production	Productivity (metric tons/ha)	%Growth in Productivity
2001-02	16592	145785			8.8	
2002-03	16270	144380	-1.9	-1.0	8.9	1.0
2003-04	19208	153302	18.1	6.2	8.0	-10.1
2004-05	18445	166939	-4.0	8.9	9.1	13.4
2005-06	18707	182816	1.4	9.5	9.8	8.0
2006-07	19389	191813	3.6	4.9	9.9	1.2
2007-08	20207	211235	4.2	10.1	10.5	5.7
2008-09	20662	214716	2.3	1.6	10.4	-0.6
2009-10	20876	223089	1.0	3.9	10.7	2.8
2010-11	21825	240531	4.5	7.8	11.0	3.1
2011-12	23242	257277	6.5	7.0	11.1	0.4
2012-13	23694	268847	1.9	4.5	11.3	2.5
2013-14	24198	277352	2.1	3.2	11.5	1.0

***Source*:** NHB Database 2014, Calculated by Author

Table 4: Trend Growth Rate in Area, Production and Productivity of Horticulture Crops of India (In Per cent)

	1991-92 to 1995-96	1996-97 to 2001-02	2001-02 to 2005-06	2006-07 to 2010-11	2011-12 to 2013-14
Area	1.37	1.74	2.41	2.36	1.42
Production	5.37	3.48	4.63	4.63	2.54
Productivity	4.17	1.74	2.18	2.13	1.19

***Source*:** www.IndiaAgristat.com, Calculated by Author

Table 5: Value of Output of Horticulture Crops with Percentage Share in Agriculture (At constant prices) (Rs '00 Crore)

	Value of Output (Rs. '00 Crore)			% Share in Total Agriculture		
	2008-09	2009-10	2010-11	2008-09	2009-10	2010-11
All Agricultural Crops	**5250**	**5241**	**5761**			
Total Fruits and Vegetables	1288.62	1286.18	1292.02	24.5	24.5	22.4
Total Condiments &Spices	155	170	185	2.9	3.2	3.2
Total Floriculture	70	75	80	1.3	1.4	1.4
(i) Coconut	76	82	88	1.4	1.6	1.5
(ii) Cashew nut	17	20	14	0.3	0.4	0.2
(iii) Cocoa	0.2	0.19	0.2	0	0	0
(iv) Arecanut	28.5	29.07	37.6	0.5	0.6	0.7
Total Plantation Crops (i)+(ii)+(iii)+(iv)	122	131	140	2.3	2.5	2.4
Total Horticulture	**1635**	**1662**	**1697**	**31.1**	**31.7**	**29.5**

***Source*:** State wise estimates of output from Agriculture & Allied Activities, CSO, M/o Statistics & Programme Implementation

Table 6: Area and Production of Horticulture Crops for the years (2011-12, 2012-13 and 2013-14)
(A: Area in '000 Ha; P: Production in '000 MT)

Crops		2011-12			2012-13			2013-14	
	Area	Production	PdY*.	Area	Production	PdY*.	Area	Production	PdY*.
Fruits									
Banana	797	28455	35.7	776	26509	34.2	803	29725	37
Mango	2378	16196	6.8	2500	18002	7.2	2516	18431	7.3
citrus	915	7922	8.7	1042	10090	9.7	1078	11147	10.3
Papaya	117	4457	38.1	132	5382	40.7	133	5639	42.3
guava	220	2510	11.4	236	3198	13.6	268	3668	13.7
Apple	322	2203	6.8	312	1915	6.1	119	2585	21.8
Pineapple	102	1500	14.7	105	1571	14.9	313	2498	8
Sapota	163	1426	8.7	164	1495	9.1	177	1744	9.9
grapes	116	2221	19.1	118	2483	21.1	110	1737	15.8
Pomegranate	112	772	6.9	113	745	6.6	131	1346	10.3
litchi	80	538	6.7	83	580	7	84	585	7
Others	1383	8224	5.9	1402	9315	6.6	1484	9872	6.7
Fruits-total	**6705**	**76424**	**11.4**	**6982**	**81285**	**11.6**	**7216**	**88977**	**12.3**
Vegetables									
Potato	1907	41483	21.8	1992	45344	22.8	1973	41555	21.1
tomato	907	18653	20.6	880	18227	20.7	1204	19402	16.1
Onion	1087	17511	16.1	1052	16813	16	882	18736	21.2
Brinjal	692	12634	18.3	722	13444	18.6	711	13558	19.1
tapioca	227	8747	38.5	207	7237	35	228	8139	35.7
cabbage	390	8412	21.6	372	8534	22.9	400	9039	22.6
Caulilower	391	7349	18.8	402	7887	19.6	434	8573	19.8
Okra	518	6259	12.1	231	6350	27.5	533	6346	11.9
Peas	408	3745	9.2	421	4006	9.5	434	3869	8.9
Sweet Potato	110	1073	9.8	112	1132	10.1	106	1088	10.3
Others	2352	30459	13	2815	33213	11.8	2492	32591	13.1
Veg.-total	**8989**	**156325**	**17.4**	**9205**	**162187**	**17.6**	**9396**	**162897**	**17.3**
Aromatic	506	566	1.1	557	918	1.6	493	895	1.8
Flowers Loose	254	1652	6.5	233	1729	7.4	255	1754	6.9
Flowers Cut*		75066			76732			543	
Plantation crops	3577	16359	4.6	3641	16985	4.7	3675	16301	4.4
Spices	3212	5951	1.9	3076	5744	1.9	3163	5908	1.9
Honey								76	
Grand Total	**23243**	**257277**	**11.1**	**23695**	**268847**	**11.3**	**24198**	**277352**	**11.5**

***Source*:** http://www.indiastat.com/ and www.IndiaAgristat.com, Data net India Pvt. Ltd.
PdY* Productivity (000 MT)

Table 7: Percentage Share of Production of various Horticulture Crops in Total Horticulture for last three years

Crops	% Share in Total Horticulture				
	2009-10	2010-11	2011-12	2012-13	2013-14
Fruits	32.2	31.1	29.7	30.2	32.08
Vegetables	60	61	60.8	60.3	58.73
Flowers &Aromatics	0.7	0.7	0.9	1	1.15
Plantation Crops	5.3	5	6.4	6.3	5.88
Spices	1.8	2.2	2.3	2.1	2.13
Total Horticulture	100	100	100	100	100

***Source*:** NHB Database 2014, Calculated by Author

Table 8: Production of Horticulture vis-à-vis Food grains

Year	Production (In Million Tons)	
	Total Horticulture	Total Foodgrain
2001-02	145.79	212.85
2002-03	144.38	174.77
2003-04	153.30	213.19
2004-05	166.94	198.36
2005-06	182.82	208.60
2006-07	191.81	217.28
2007-08	211.24	230.78
2008-09	214.72	234.47
2009-10	223.09	218.11

2010-11	240.53	244.49
2011-12	257.28	259.29
2012-13	268.85	257.13
2013-14	280.79	266.57

***Source*:** Hand Book on Horticulture Statistics 2014, Ministry of Agriculture, Department of Agriculture and Cooperation, GOI

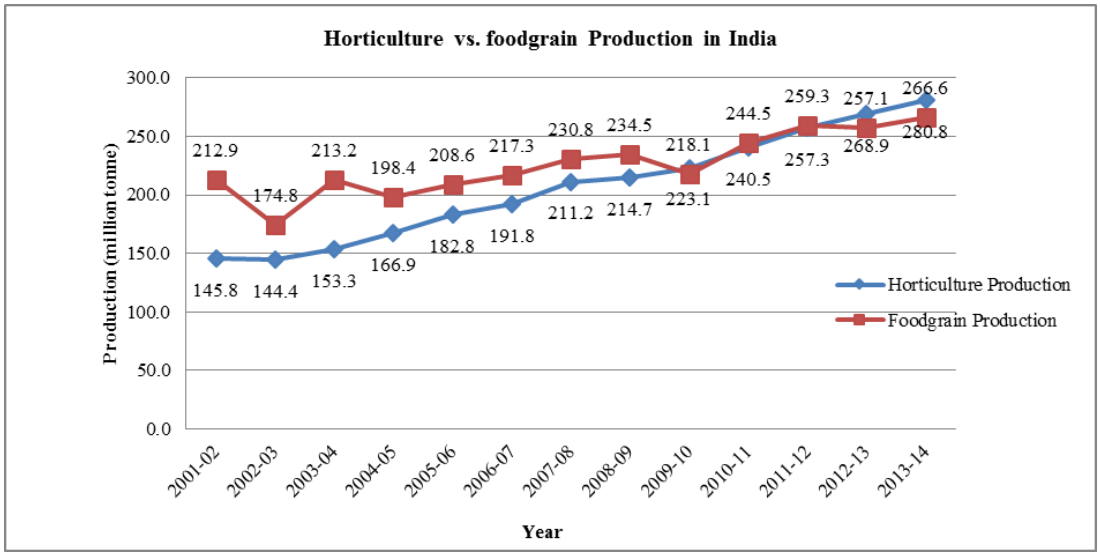


Fig 2: Production of Horticulture vs. Production of food grains in India, from 2001-02 to 2013-14

Table 9: Export of Horticulture Produce from India

	2012-13		2013-14		2014-15		%age share
PRODUCT	**Qty**	**Rs. Lacs**	**Qty**	**Rs. Lacs**	**Qty**	**Rs. Lacs**	**in 2014-15**
Floriculture	27121.86	42344.6	22485.21	45590.62	22947.27	46077.23	0.35
Fruits & Vegetables Seeds	17168	34772.39	17816.7	41053.76	12499.31	42703.8	0.33
Fresh Onions	1666873	196662.7	1482499	316961.3	1238103	230054.14	1.75
Other Fresh Vegetables	768627.2	151633.6	953731.2	229332.3	835501.2	240223.6	1.83
Walnuts	5295.47	19983.57	6726.36	32453.5	2665.85	13645.24	0.1
Fresh Mangoes	55584.99	26471.78	41279.97	28542.85	42998.33	30253.66	0.23
Fresh Grapes	172744.4	125942.8	192616.9	166647.5	107257.8	108648.99	0.83
Other Fresh Fruits	263970.3	77975.78	240552.5	102159.2	274436.1	124588.02	0.95
Cucumber and Gherkins(Prepd. & Presvd)	238624.9	85659.18	218749.8	95520.18	251183	120242.24	0.92
Dried & Preserved Vegetables	68520.25	63795.76	56158.38	74271.74	63701.77	84713.55	0.65
Mango Pulp	147815.7	60855.73	174860.3	77294.76	154820.7	84138.54	0.64
Other Processed Fruits & Vegetables	269217.3	173305.5	287384.6	226660.3	316059.4	256991.89	1.96
Total	**3701563**	**1059403**	**3694861**	**1436488**	**3322173**	**1382281**	**10.54**

***Source*:** APEDA, Ministry of Commerce and Industries GOI

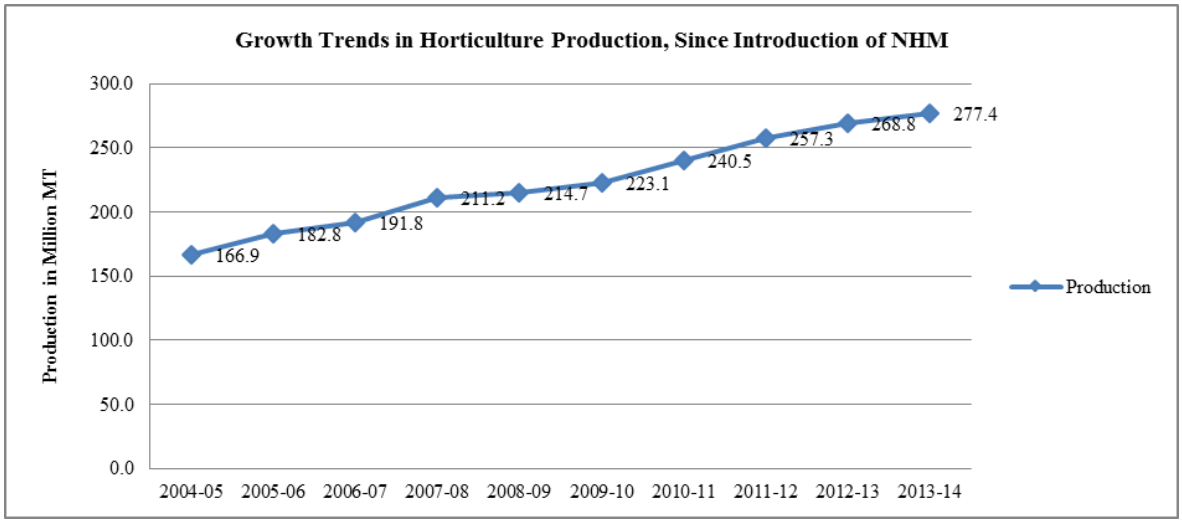


Fig 2: Growth Trends in Horticulture Production, Since Introduction of NHM

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