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Performance of horticultural crops in India macro level study

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Abstract
To secure the livelihood through farm income and employment and also to earn the foreign exchange during the liberalization regime horticulture has been playing an important role. The study analyses the growth of India's horticulture sector (Agricultural crops, fruits, vegetables, and other horticultural crops) from 1952-53 to 2023–24, a period chosen for its significant policy changes and technological advancements over a period of time. Therefore, analysing the area and understanding the production trends through Compound Growth Rates (CGR) has been the main objective of this work. The study finds that the agricultural growth is negative and very slow whereas the horticulture sector shown a remarkable increase in the production of fruit (289.98 per cent) and vegetables (256.98 per cent). The study finds that the area under cultivation and yield per hectare are the strongest predictors of output across horticultural crops. It highlights the importance of investing in the horticultural development in terms of technology; infrastructure like markets, cold storages, transport facilities and giving market information about the existing prices in various markets to the producers. This will go a long way to the horticulturists and horticulture sector in the country as there is lot of scope for the development of the sector.

Keywords: Are under various horticultural crops, compound growth rate, positive, growth, negative growth, performance, technology, infrastructure, policy, makers, horticulture development

Introduction

Agriculture sector plays an important role in the growth and development of a developing economy like India. It is well known fact that economies of developing countries are based on agriculture sector. Most of the people in the developing economies are dependent on agriculture and allied activities. The employment generation and livelihood depend mainly on agriculture and supporting industries and businesses. Generally, focus of agricultural policy in developing nations is on employment generation in tribal and rural areas, poverty eradication and equal distribution of income with high economic growth. Moreover, it is expected to contribute these socially backward groups more in overall development of a nation. However, there are limitations in the expansion of area under cultivation and therefore, it is essential to increase productivity of agriculture sector through appropriate investment in basic infrastructure, research and extension.

India is the land of agriculture and agriculture is the main occupation directly or indirectly for more than 57 per cent of the population of our country (NSS Survey 13th round). The economic prosperity of our country to a major extent depends on prosperity of agriculture. Mahatma Gandhi said that *"India lives in villages"*. While signing a visitors book he said that *"I preferred to be known as a farmer"* (cited by Swaminathan, 2007). It is a known fact that most of the Indian population live in villages and the majority of villagers are engaged in agriculture. Agriculture along with other allied activities like animal husbandry, forestry and fisheries is a dynamic and an important component of our economy that provides livelihood for about 59 per cent of our population (NSS Survey 13th round).

Growth of Agriculture in Pre and Post-Independence India:

Agriculture in India has a history of more than five thousand years. In the beginning the agriculture prospered on the banks of rivers and it was spread to the plains alongside. Under the British rule the agriculture sector in India came under drastic changes. The British administrators brought policies with vested interests for their country and neglected agricultural growth in India. The implementation of different measures such as the Zamindari System, the Royatwari system and Mahalwari system under British colonialism resulted in increase in the number of marginal and small farmers generally tend to become increasingly vulnerable and marginalised losing their own agricultural land in the system (Reddy; 2009) [6]. Roadways and railways were expanded in the nineteenth century and as a consequence, connection between regional markets and port markets in major cities improved significantly.

The instant and most important effect of the crisis was a drop in agricultural prices, which impacted all types of farmers in terms of lower farm incomes, especially small and marginal farmers who had obtained advance loans from money-lenders on the recurrent expenditure of a portion of their produce in exchange for the latter grabbing a portion of the farmers' produce without enduring the eviction risk. Agriculture in India had seen profound changes after the Independence from British rule. In the first five year plan the emphasis was given on developing agriculture. Later, in 1952 Community Development Programme has been implemented for the welfare of farmers. The significance for agriculture had not disappeared even though the stress was given on industrialisation. The new democratic state had soon realised that achieving self-sufficiency and even surplus in food production is the basis for India's nationalism. Even farmers had participated in it, which was very crucial. For this surplus food production heavy investment was needed. The necessity for agricultural credit increases due to various reasons. For the initial investment in the process of crop production is needed as the majority of the marginal and small farmers are economically weak. Due to the continuous consumption of farmers and

seasonality of agricultural production the farmers are always in need of agricultural credit.

During the first five year plan (1951-56) the emphasis was laid on agriculture. From the first five year plan to the third five year plan ranging from 1950 to 1965 was considered pre-era for the green revolution. The first five year plan yielded higher productivity in agricultural crops. Importantly during this period community development programme has been started (1952). During this period various agricultural reforms have been done like abolition of Zamindari system, reducing large land holdings and bringing changes in tenancy rights. During 1950 to 1965 even though the food production increased but the import of the same had not stopped and surprisingly the import of food products increased.

Various committees were appointed to look into the matter why the agriculture sector is not performing well. The committee appointed by the Govt. recommended for high yielding variety seeds, modern fertilisers and proper credit system for the development of agriculture. For further growth of agricultural sector Govt. of India has launched programme like Intensive Agriculture Area Programme (IAAP) and Intensive Agriculture Development Programme (IADP). The High Yielding Variety Seeds Programme had been started in 1965 which led to the Green Revolution in Indian agricultural sector by increasing agricultural output particularly in wheat, paddy, maize, etc. But this is not continued for a longer time as the area and production started declining for the major crops during 1980's and 1990's (Rao and Gopalappa 2004) [5]. Therefore to protect the agriculture sector - Crop and Activity diversification suggested by various committees and experts (Gopalappa 1996 and Weinberger 2007) [3]. In this direction horticulture sector started gaining importance especially after the green revolution period (Chand, Raju and Pondey 2008) [1]. Therefore, in this paper an effort is made to understand the performance of the horticultural crops over a period of time. The horticulture sector in India has experienced remarkable growth over the past few decades, transitioning from a marginal agricultural activity to a primary driver of agricultural growth, accounting for over 33 per cent of the agriculture Gross Value Added (GVA) and about 23 per cent of the cultivated land. India is the second-largest producer of fruits and vegetables in the world, with total horticulture production increasing from roughly 146 million tonnes in 2001-02 to an estimated production of 367.72 million tonnes in 2024-25**.**

Performance of Food Grain Crops in India – 1952-53 to 2021-22

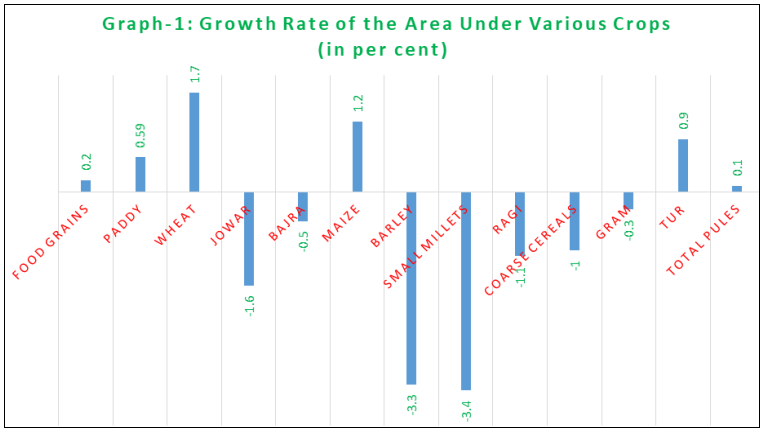
Before directly getting into the performance of horticultural products an effort is made to understand the performance of the agricultural crops and products in terms of the area, production and yield based on the secondary data. Information about the status of the irrigated area also is given to see whether irrigation sources is a problem for the growth of agricultural sector. When we observe the area under various agricultural crops we get to know that most of the agricultural crops have been showing negative GR. Wheat and Maize crops have been showing some positive trend to the extent of about 1.70 and 1.20 per cent respectively (Table-01). Paddy and Tur are the other two crops have shown some positive trend to the extent of 0.59 and Tur 0.90 per cent respectively. When it comes to the total food grains and Total Pulses they are growing very marginally to the extent of about 0.20 and 0.10 per cent respectively. Whereas the population GR was 1.42 per cent per annum during 2011 Census and 0.89 per cent during 2023-24. Though population also is declining but not at the rate of agricultural area GR. Therefore, the difference clearly exists between these variables.

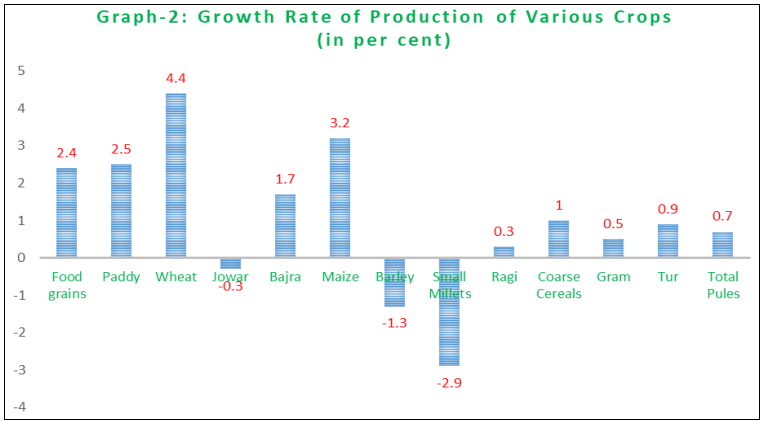
Agricultural area has been showing the declining trend whereas the production and yield have been increasing due to the technological breakthrough resulted in the usage of HYV seeds, fertilizers and pesticides. If the area also increases along with the increase in production and yield we can achieve wonders and we can export more and more of the agricultural products in turn this will help us to earn the foreign exchange, which can be used for the development of our economy. The same Table-1 clearly reveals that irrigation source though it is not achieved major breakthrough to increase the cropping intensity the GR of the irrigated area has been positive for all the crops except some minor crops. Some of the results of the area, production and yield have been clearly presented in the Graphs-1, 2 and 3 for better understanding. All the three graphs clearly indicate that the yield rate has been very much positive for all the crops but for the area and production they fluctuate.

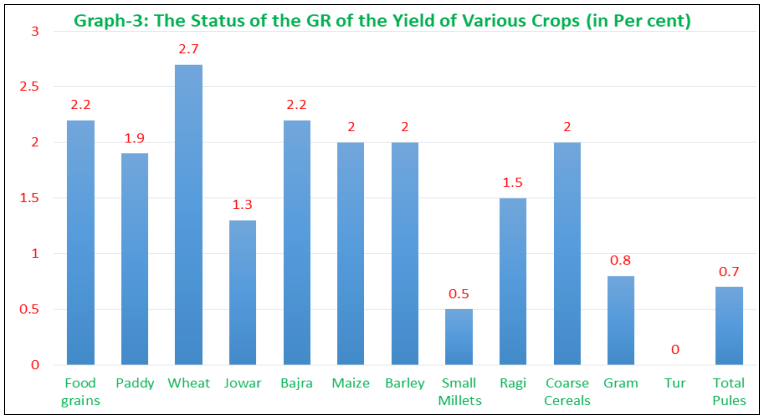
Table 1: Performance of Major Food Grain Crops in India During the Period from 1952-53 to 2021-22 (CAGR).

Particular	Cropped Area	Irrigated Area	Production	Yield
All India				
Food grains	0.20	2.08	2.40	2.20
Paddy	0.59	1.57	2.50	1.90
Wheat	1.70	3.74	4.40	2.70
Jowar	-1.60	0.27	-0.30	1.30
Bajra	-0.50	1.58	1.70	2.20
Maize	1.20	2.45	3.20	2.00
Barley	-3.30	NA	-1.30	2.00
Small Millets	-3.40	NA	-2.90	0.50
Ragi	-1.10	NA	0.30	1.50
Coarse Cereals	-1.00	0.16	1.00	2.00
Gram	-0.30	1.41	0.50	0.80
Tur	0.90	6.76	0.90	0.00
Total Pules	0.10	1.19	0.70	0.70

Source: 1 Calculation is based on the data collected from Directorate of Economics and Statistics, Ministry of Agriculture, Government of India







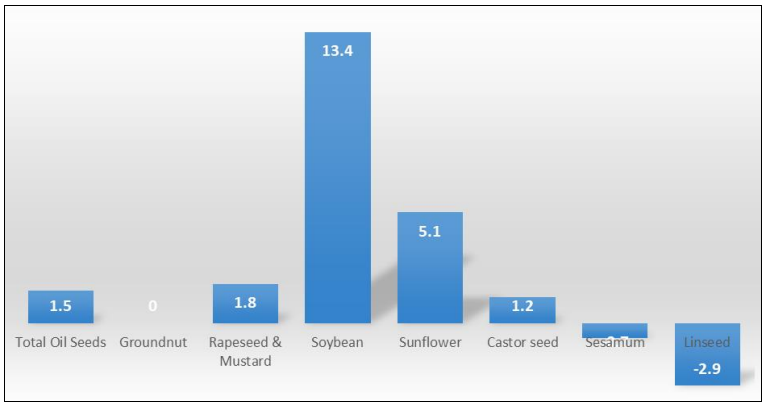
Performance of the Oilseed Crops in India – 1952-53 to 2021-22

The cropped area under various crops of the oilseeds has been growing positively may be at lower rate. The total oilseeds GR is 1.50 per cent per annum (Table-02). Soybean the GR is very much high constituting 13.40 per cent and this is followed by sunflower, which is 5.10 per cent. The total oilseeds production is growing at the rate of three per cent. Even in case of the production also we find soybean is the highest constituting 14.70 per cent and this is followed by sunflower. Though oilseeds area and production has been increasing, our country is not self-sufficient in the production of edible oils, which are being imported. The moment war started in the gulf the price of edible oils also has gone up and evidence is not required for this (the present war between Iran and Israel). The reason may be the yield rates are not improving and therefore India is facing the problem of shortage of the edible oils. Graphs-4, 5 and 6 are given to explain the performance very clearly.

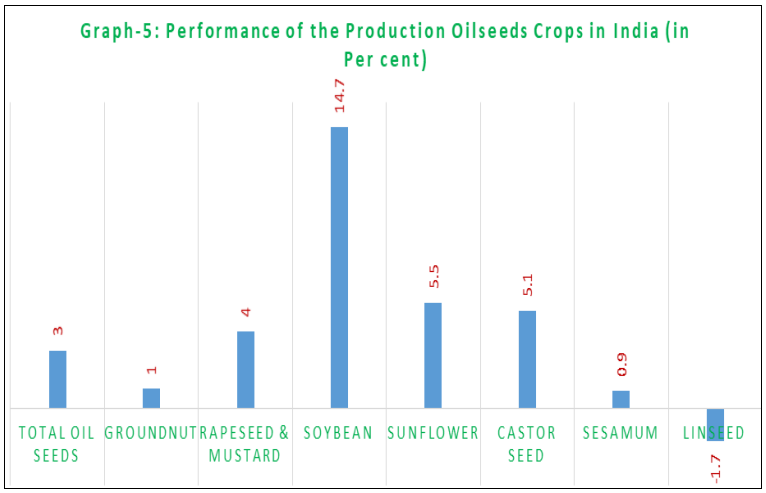
Table 2: Performance of Oilseed Crops in India During the Period 1952-53 to 2021-22 (CAGR).

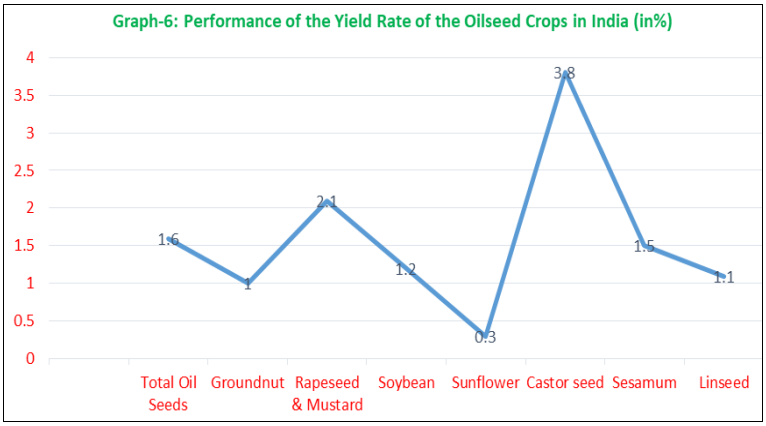
Particular	Crop ped Area	Irrigated Area	Produc-tion	Yield
Total Oil Seeds	1.50	6.44	3.00	1.60
Groundnut	0.00	4.46	1.00	1.00
Rapeseed & Mustard	1.80	6.16	4.00	2.10
Soybean	13.40	-3.97	14.70	1.20
Sunflower	5.10	-1.33	5.50	0.30
Castor seed	1.20	NA	5.10	3.80
Sesamum	-0.70	NA	0.90	1.50
Linseed	-2.90	NA	-1.70	1.10

Source: Calculation is based on the data collected from Directorate of Economics and Statistics, Ministry of Agriculture, Government of India



Graph 4: Performance of the Oilseeds Crop in India (in Per cent).





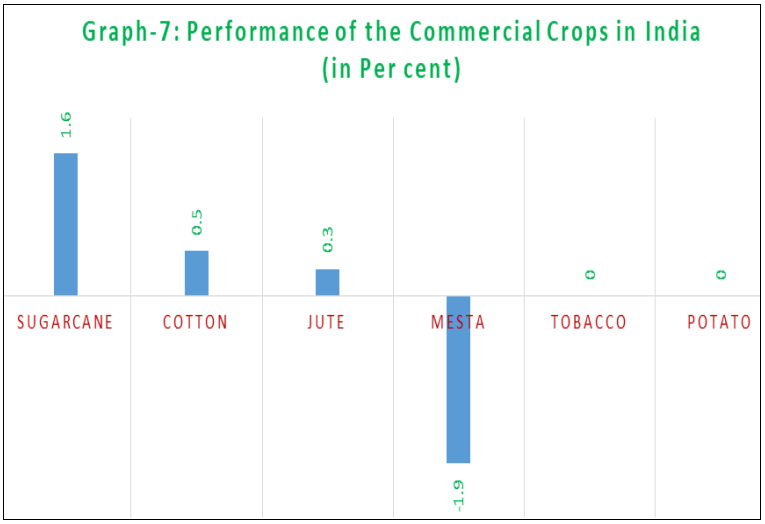
Performance of Commercial Crops in India – 1952-53 to 2021-22

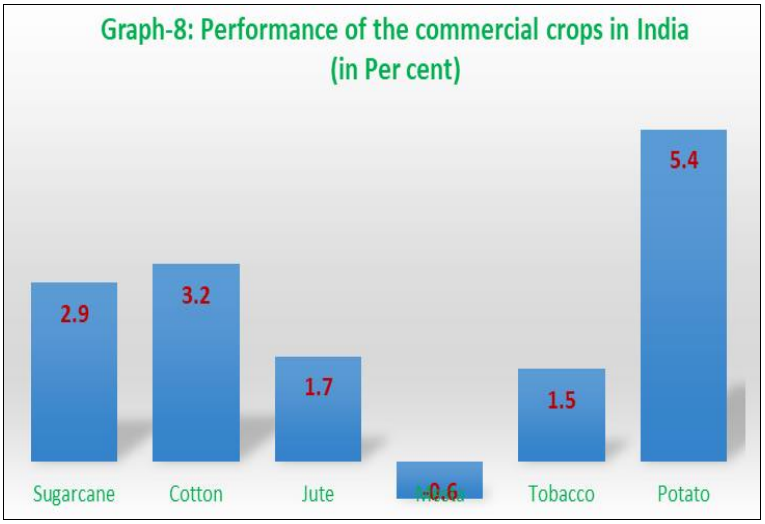
After having studied the oilseed crops an effort is made to study the performance of the commercial crops in the country. Area under sugarcane has been growing at the rate of 1.60 per cent and its production is growing at the rate of 2.90 per cent. Area under the cotton crop is 0.50 per cent and the production is growing at the rate of 3.20 per cent. In case of the crop potato the area is not growing at all and it is constant, whereas the production is growing at the rate of 5.40 per cent, which is much more when compared to any other crop (it is an horticultural crop). The yield rates are positive but not very high and therefore, the performance of the horticultural crops is very normal. Graphs-7, 8 and 9 are given towards more clarity.

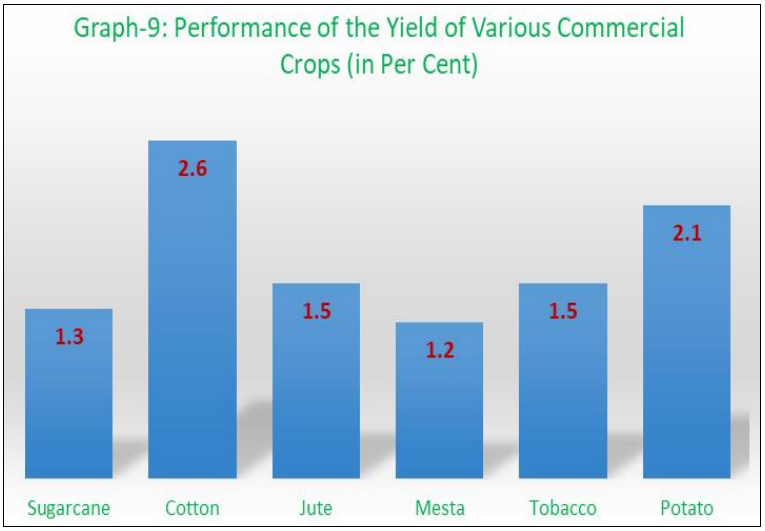
Table 3: Performance of Major Commercial Crops during the Period 1952-53 to 2021-22 (CAGR).

Particular	Cropped Area	Irrigated Area	Production	Yield
Sugarcane	1.60	2.34	2.90	1.30
Cotton	0.50	2.82	3.20	2.60
Jute	0.30	NA	1.70	1.50
Mesta	-1.90	NA	-0.60	1.20
Tobacco	0.00	2.28	1.50	1.50
Potato	0.00	NA	5.40	2.10

Source: Calculation based on data collected from Directorate of Economics and Statistics, Ministry of Agriculture, Government of India







Performance of the Horticultural Crops in India – 2000-01 to 2023-24

1. Performance Based on the Simple GR/Percentage Change

Data in relation to the individual horticultural crops is not available at the all India level and therefore, total vegetables, fruit crops and other horticultural crops are considered for this analysis. The data from the year 2000-01 to 2023-24 is collected and analysed by using simple GR and Compound Growth Rate (CGR) for all the variables. Firstly the performance of the vegetable crops reveals that year to year there is an increasing trend in the area except the years 2000-01 and 2014-15 where the annual percentage change is negative. Otherwise all the 22 years the percentage change is positive and it is welcome trend. At four time periods out of 24 years the area under fruit crops has shown negative annual growth rate otherwise the remaining 20 years the area has been increasing again it is welcome situation. All the other horticultural crops we find positive trend except the agricultural years 2004-05, 2007-

08, 2008-09, 2014-15 and 2018-19. During these years the GR is negative though the negative results are at lower values but the performance is negative. The total horticultural crops, the performance is very much positive except the years 2001-02 and 2002-03. Therefore the GR of the area clearly reveals that there is a positive indication to say that the performance of the horticultural crops has been positive, which clearly highlights that there is lot of scope for the improvement of the horticultural crops in the country (The Economic Times 2023 and The Hindu Bureau 2023).

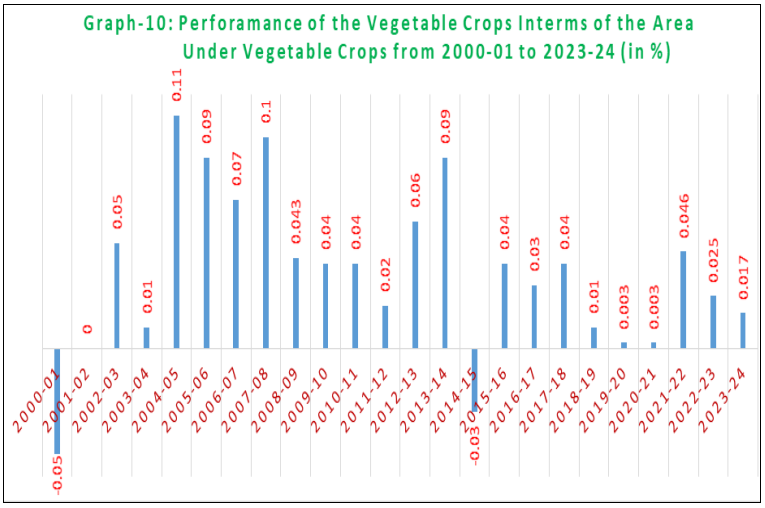
Table 4: Growth Rate of the Area under Horticultural Crops at the all India.

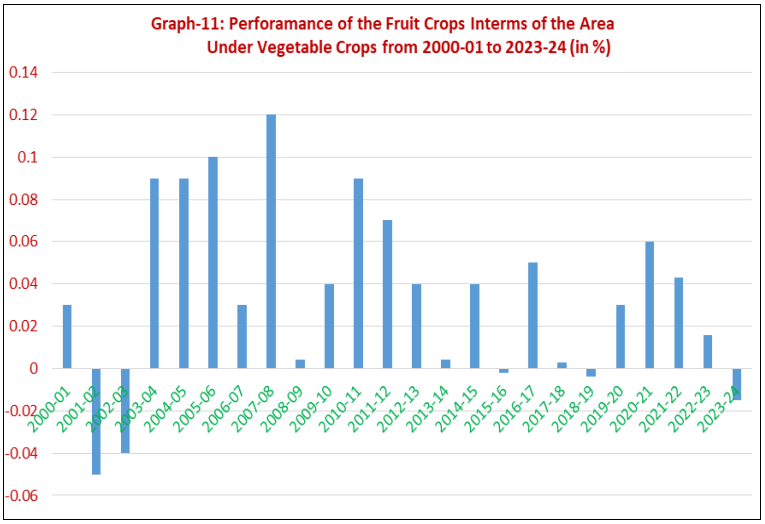
Years	Vege-tables	Fruits	Other Horticultural Crops	Total Horticultural Crops
2000-01	-0.050	0.030	0.020	0.010
2001-02	0.000	-0.050	0.070	-0.030
2002-03	0.050	-0.040	0.010	-0.010
2003-04	0.010	0.090	0.330	0.090
2004-05	0.110	0.090	-0.220	0.060
2005-06	0.090	0.100	0.080	0.090
2006-07	0.070	0.030	0.070	0.050
2007-08	0.100	0.120	-0.004	0.100
2008-09	0.043	0.004	-0.001	0.020
2009-10	0.040	0.040	0.037	0.040
2010-11	0.040	0.090	0.082	0.080
2011-12	0.020	0.070	0.290	0.070
2012-13	0.060	0.040	0.030	0.040
2013-14	0.090	0.004	0.004	0.030
2014-15	-0.030	0.040	-0.020	0.010
2015-16	0.040	-0.002	0.080	0.020
2016-17	0.030	0.050	0.090	0.050
2017-18	0.040	0.003	0.020	0.030
2018-19	0.01	-0.004	-0.008	0.000
2019-20	0.003	0.030	0.006	0.030
2020-21	0.003	0.060	0.052	0.040
2021-22	0.046	0.043	-0.036	0.040
2022-23	0.025	0.016	0.071	0.010
2023-24	0.017	-0.015	0.032	0.001
Overall GR	1.66	2.05	1.61	1.89

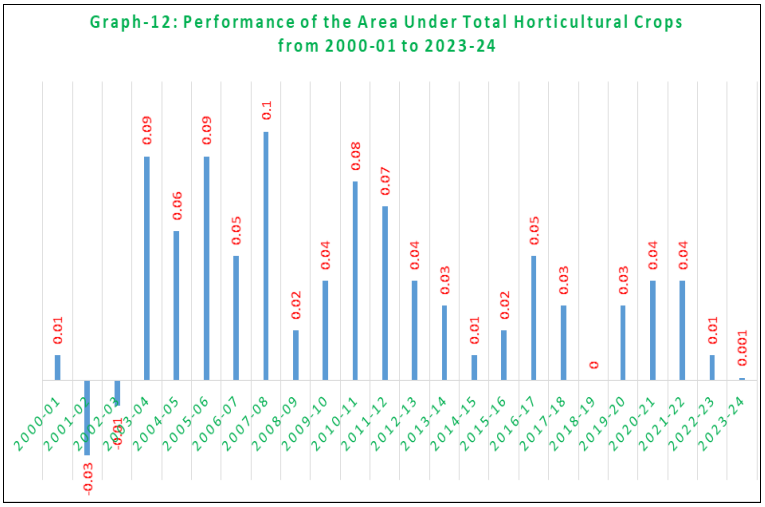
Sources: 1. Central Statistical Organization, Government of India
2. Various Issues of the Economic Survey, Government of India

2. Performance Based on the CGR

From the agricultural years 2000-01 to 2023-24 about 24 years the performance is presented in the same Table-04. The table clearly reveals that the area under vegetables growing at the rate of 1.66 per cent, the fruit crops it is growing at the rate of 2.05 per cent and all other horticultural crops it is growing at the rate of 1.61 per cent. This clearly explains the fact that the horticultural crops performance is positive and stable unlike the food crops and the commercial crops. Even the performance of the total horticultural crops growing at the rate of 1.89 per cent, which is more than the Food Grains, Pulse Crops, Commercial Crops and Oilseed Crops. The analysis clearly reveals that the performance of the horticultural crops is very much encouragive and there is lot of scope for the growth and development of the horticultural crops in the country (Subramanyam 1981). Graphs-10, 11 and 12 are given towards more clarity.







Conclusion

The comprehensive time-series analysis presented in this study demonstrate that India's horticultural sector has evolved into a key pillar of agricultural growth, food security and rural transformation. Over the past three decades, horticultural production has expanded more than twofold, primarily driven by productivity gains supported by technological progress, diversification and favourable policy interventions. The study emphasizes that India's horticultural success is rooted in efficiency improvements rather than mere expansion, highlighting the sector's maturity and resilience. Nonetheless, achieving long-term sustainability will require targeted measures to mitigate post-harvest losses, improve resource-use efficiency and integrate climate smart technologies (Kumar et.al., 2026) [4]. The insights derived from this study contribute to the growing body of evidence on agricultural diversification and offer actionable guidance for policymakers, researchers, and industry stakeholders working towards a resilient and sustainable horticultural future.

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