



ISSN Print: 2394-7500  
ISSN Online: 2394-5869  
Impact Factor: 5.2  
IJAR 2017; 3(6): 438-441  
www.allresearchjournal.com  
Received: 09-04-2017  
Accepted: 10-05-2017

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## Level of horticulture development in Bihar: A district-wise comparative analysis

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### Abstract

Agriculture is the core of Indian Economy. In the recent past, with the growth of technology, modernization and changes in food habits, agricultural cropping pattern of the country has undergone a major shift moving away from the cereal to non-cereal crops cultivation, especially towards the horticulture crops. Horticulture includes the cultivation of fruits, vegetables, potato and tuber crops, ornamental, medicinal and aromatic crops, spices and plantation crops. Today horticulture in the country is more vibrant and dynamic sector than ever before. It contributes nearly 30 percent of the agricultural GDP. And the state of Bihar is one of the largest producers of fruits and vegetables in the country. The state has a monopoly in the production of litchi. This paper is an attempt to highlight the level of horticulture development especially in terms of fruits, flowers and vegetables in Bihar during 2011-12 with the help of secondary sources. To show the level of variation Composite Z-Score technique has been employed. Afterward the thirty eight districts of Bihar has been grouped into 3 categories i.e., High, Medium, Low in term of horticulture development. Analysis of the result shows that there is huge variation in between the district of the state. Overviewing the current status, it is evident that there is ample opportunity for the development of horticulture in the state.

**Keywords:** Horticulture, Vegetable Production, Floriculture, Perennial fruit crops, Bihar

### 1. Introduction

Agriculture and allied sector plays an important role for the sustainable growth and development of the Indian Economy. Besides providing food to nation agriculture releases labor, provides savings, contributes to market of industrial goods and earns foreign exchange. India with its wide variability of climate and soil is highly favorable for a large number of horticultural crops. It is the fastest growing sectors within agriculture and considered the fruit and vegetable as a basket of the world. Over the years, horticulture has emerged as one of the potential agricultural enterprise in accelerating the growth of Indian economy. Its role in the country's nutritional security, poverty alleviation and employment generation programs is becoming increasingly important. It offers not only a wide range of options to the farmers for crop diversification, but also provides ample scope for sustaining large number of agro industries which generate huge employment opportunities (GOI, Planning Commission 2001)<sup>[4]</sup>.

The origin of horticulture is intimately associated with the history of mankind. The word Horticulture is derived from two Latin words i.e, Hortus means garden and Colere meaning to grow or to cultivate and it can be defined as the branch of agriculture concerned with intensively cultivated plants directly used by man for food, medicinal and for aesthetic purposes. Horticulture associated with four branches in which Pomology treat of fruits, Olericulture treat with vegetables, Floriculture with flowers and landscape development. With the growth of technology, modernization and changes in food habits of the people, the sector has undergone a major shift in the recent past and got a tremendous potential to push overall agriculture growth above the country's targeted 4 percent level (Bahadur, 2010)<sup>[1]</sup>.

Having realized the importance of this sector, National Horticulture Mission was launched in 2005-06. Now the country is one of the leading producers of horticultural crops in the globe, next to China. Of the fruits the country is the largest producer of mango, banana, coconut, cashew, papaya and pomegranate and also the largest exporter of spices.

At present the Country ranks first in the productivity of grapes, banana, cassava, peas, and papaya. India produced around 146.55 mt of vegetables and 74.88 mt of fruits (2010-11)

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which accounts for nearly 14.0% and 12% of country's share in the world production of vegetables and fruits respectively. At present, India produces 257.2 million tonnes of horticulture crops from an area of 23 million ha. Over the last few decades the area under horticulture grew about 3.8% per annum and its production rose by 7.4% (Chopra, 2013).

In this context, the state of Bihar, endowed with very fertile plain land and subtropical climate holds a vast potential for growing a large variety of Horticultural crops. Bihar has a geographical area of 94,163 sq. km and is located in the eastern part of the country. Under Horticultural crops Bihar ranks 8<sup>th</sup> in respects of area(11.21 lakh hectares) and 5<sup>th</sup> in respect of production (173.35 lakh MT) and ranks 3<sup>rd</sup> in vegetable production in the country ( NHM, 2010-11). It is the largest producer of Litchi, 3<sup>rd</sup> producer of pineapple and 4<sup>th</sup> largest producer of mango in the country. The reason behind this the agro climatic condition which are eminently suitable for whole range of vegetable, a variety of roots and tuber crops, perennial fruit crops like mango, litchi, guava, limes. Of late Floriculture is also showing excellent prospects. The state thus has possibilities for growing a diversified basket of vegetables, fruits, spices, flowers, medicinal and aromatic plants.

**Objectives**

This paper is an attempt to highlight the level of horticulture development especially in terms of fruits, flowers and vegetables in Bihar during 2011-12.

**Database and Methodology**

The present study is primarily based on secondary sources of data. The relevant data is collected from different government sources which include National Horticulture Mission, Annual Action Plan (2005-06), National Horticulture Mission, Annual Action Plan (2010-11), National Horticulture Mission, (2011-12) Bihar. The collected were organized, tabulated and the results were analyzed with the help of statistical technique. In order to determine the level of horticultural development following indicators are considered- Area and Production of Fruits (mango, guava, litchi, lemon, banana, pineapple and papaya), Vegetables (potato, onion, tomato, cauliflower, brinjal, okra, and bottle gourd), Flowers (Rose, gladiolus, marigold, jasmine, tuberose and others). To determine the overall level of horticultural development and its uneven distribution in the study area the data of all the indicators have been transformed into indices using Z score techniques.

$$Z_i = \frac{x_i - x}{sd}$$

Where  $Z_i$  = standard score of the  $i^{th}$  observation.

$x_i$  = actual value of the  $i^{th}$  observation.

$x$  = mean of the value of x variable.

$sd$  = standard deviation of x variable.

Further the results of the standard score obtained for different indicators were aggregated by composite standard

score (CSS), that will indicate an index of agricultural development. The CSS may be expressed as

$$CSS = \sum z_{ij}/N$$

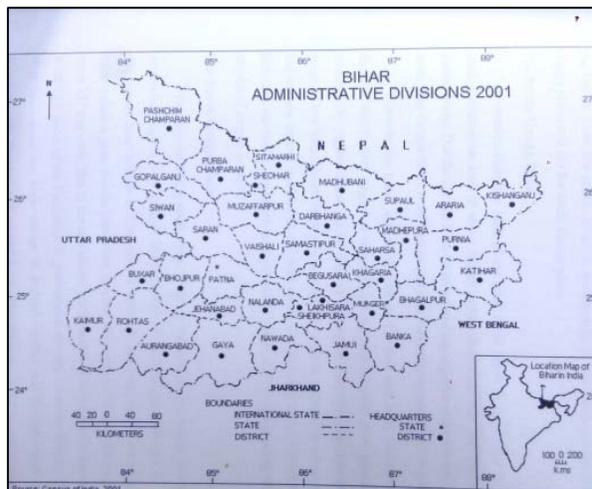
CSS = composite mean Z score

$Z_{ij}$  = Z score of variables

$j$  = in observation

$N$  = number of variables

In order to classify the districts according to their level of development the composite z score have been divided into 3 classes i.e., High, Medium and Low.



**Study Area**

Bihar is located in the eastern part of the country situated between 24°20'21" to 27°31'15" N Latitude and 83°19'50" to 88°17'40" E Longitude. The river Ganga flows through the middle of Bihar plain from west to east and divides it into two halves. The state lies midway between the humid West Bengal in the east and the sub-humid UP in the west, which gives it a transitional position in terms of climate. The average rainfall in Bihar is largely due to south-west monsoon, which accounts for around 85% of total rainfall in the state. The total geographical area of the state is 94163 sq. km with three agro-climatic zones: North-west, North-east, and South. North-west zone has 13 districts and the soil is mostly loam and sandy loam. The North-east zone has 8 districts and has loam and clay loam soils. Finally the south zone has 17 districts and its soil is sandy loam, loam, clay and clay loam. The total population of Bihar is 83 million with a population density of 881 /sq. km and with sex ratio of 921. The literacy rate is 63.8%.

**Results and discussions**

The district- wise analysis of the area and production of horticultural crops (fruits, vegetables, and flowers) reveals a substantial spread of horticultural production across the districts of Bihar. Table 1 and 2 presents the data for spatial variation regarding the area and production of horticultural crops in different districts during 2011-12. In order to determine the level of horticultural development, thirty-eight districts of Bihar has been grouped into 3 categories i.e. High, Medium and Low on the basis of composite Z score methods.

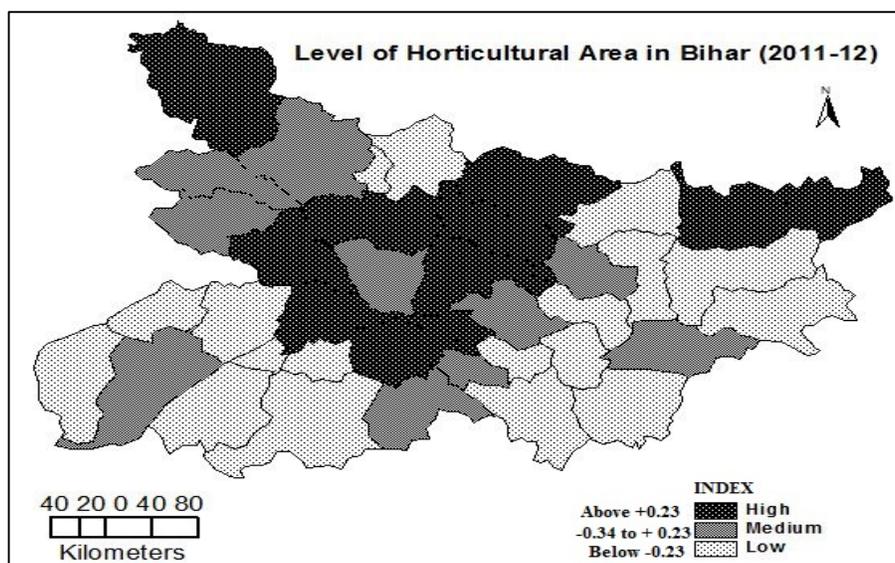
**Table 1:** Level of Area in Horticultural Crops in Bihar, 2011-12.

Category	Name of districts	Number in % districts
HIGH (>0.23)	Samastipur, Araria, Patna, Saran, Nalanda, W.Champaran, Darbhanga, Muzaffarpur, Kishanganj, Madhubani	10(26.32)
MEDIUM (0.23-(-0.34))	Sheikhpura, Siwan, Vaishali, Rohtas, Nawada, Gopalganj, Saharsa, Begusarai, E.Champaran, Bhagalpur.	10(26.32)
LOW(< -0.34)	Sheohar, Munger, Arwal, Madhepura, Khagria, Banka, Lakhisrai, Jamui, Purnea, Aurangabad, Katihar, Sitamarhi, Gaya, Jehanabad, Bhojpur, Kaimur, Buxar, Supaul.	18(47.37)

**1. High level of Area in Horticultural Crops** – Fig. 1 shows the overall area of horticultural crops in the study area. This group of development covers 26.32 percent of the study area. In this Category 10 districts are identified among which Samastipur (+1.50) ranks at the top in the level of area of horticultural crops followed by Araria, Patna, Saran, Nalanda, W.Champaran, Darbhanga, Muzaffarpur, Kishanganj and Madhubani.

**2. Medium Level of Area in Horticultural Crops** – While 10 districts are included in medium level of category which covers 26.32 percent of the area.

**3. Low Level of Area in Horticultural Crops-** Whereas 47.37 percent area have low level of horticultural development. Among which Supaul District has least area under horticultural crops followed by Sheohar, Munger, Arwal, Madhepura, Khagria, Banka, Lakhisrai, Jamui, Purnia, Aurangabad, Katihar, Sitamarhi, Gaya, Jehanabad, Bhojpur, Kaimur and Buxar.



**Table 2:** Level of Production in Horticultural Crops in Bihar 2011-12.

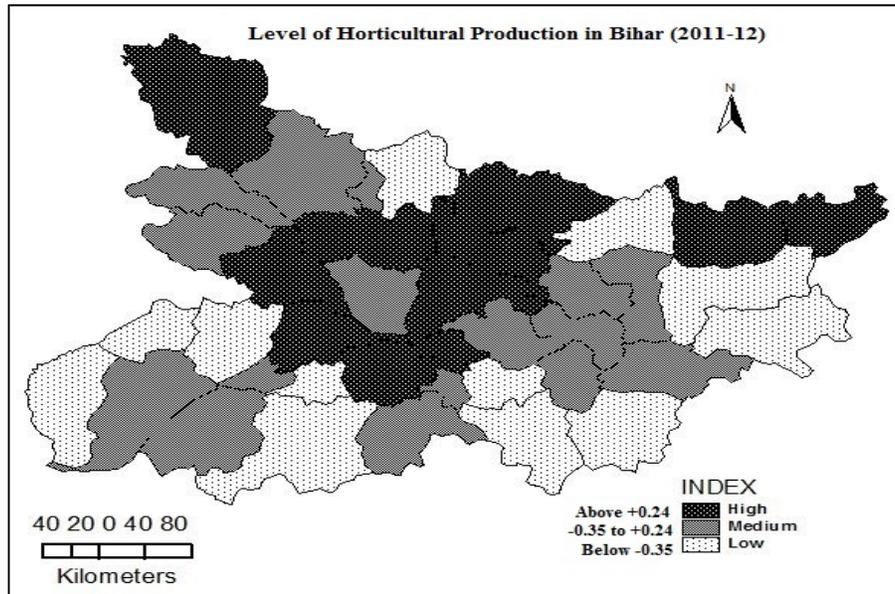
Category	Name of the districts	Number in % districts
HIGH(>0.24)	Samastipur, Araria, Patna, Saran, Nalanda, W.Champaran, Darbhanga, Kishanganj, Madhubani, Muzaffarpur.	10(26.32)
MEDIUM (0.24-(-0.35))	Sheikhpura, Siwan, Rohtas, Vaishali, Gopalganj, Saharsa, Begusarai, Arwal, Aurangabad, Sheohar, Munger, Khagria, Nawada, Bhagalpur, Madhepura, E.Champaran.	16(42.10)
LOW(<-0.35)	Lakhisrai, Jamui, Banka, Purnia, Sitamarhi, Gaya, Katihar, Jehanabad, Bhojpur, Kaimur, Buxar, Supaul.	12(31.5)

**1. High Level of Production in Horticultural Crops-** About 26.32 percent area has highest level of horticultural development in terms of area and production among which Samastipur leads in level of horticultural development in terms of both area and production followed by Araria, Patna, Saran, Nalanda, W. Champaran, Darbhanga, Kishanganj, Madhubani and Muzaffarpur.

**2. Medium Level of Production in Horticultural Crops-** While the district Sheikhpura, Siwan, Rohtas, Vaishali, Gopalganj, Saharsa, Begusarai, Arwal, Aurangabad, Sheohar, Munger, Khagria, Nawada, Bhagalpur, Madhepura

and East Champaran showed 42.10 percent of medium level of horticultural production.

**3. Low Level of Production in Horticultural Crops -** The low level of horticultural development has found in twelve districts namely Lakhisrai, Jamui, Banka, Purnia, Sitamarhi, Gaya, Katihar, Jehanabad, Bhojpur, Kaimur, Buxar and Supaul. Overall Supaul has the lowest level of horticultural development in terms of area and production and Samastipur leads top among highest level of horticultural development.



### Conclusion and Suggestions

In the study area it is found that fruits and vegetable crops cover large area under horticultural crops than floriculture. And North Bihar plain is more significant in fruit cultivation. The district Samastipur ranks top in the horticultural development followed by Araria, Patna, Saran, Nalanda W. Champaran, Darbhanga, Kishanganj, Madhubani and Muzaffarpur. These districts fall under the core area of state and they are well covered by irrigation system and fertilizers. Whereas the district Supaul have the lowest level of horticultural development followed by Buxar, Kaimur, Bhojpur, Jehanabad etc. These districts come under the periphery areas where there is a great lack of infrastructure regarding horticultural crops. Floriculture in Bihar is not developing in the same fashion as compared to other crops. So, there is need to emphasis on these crops. Horticulture cultivation is always advantageous. It paves the ways and means of development. It has been observed that it could be developed in the state if the government provides protection and subsidies to the farmers. There is a great need to emphasis on marketing management and boosting the irrigation resource of the state along with that there is need of awareness on profitability and techno managerial skill among farmers to promote the horticultural cultivation in the state.

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