



## **A COMPARATIVE STUDY ON GROWTH OF PRODUCTION AND PRODUCTIVITY OF MAJOR VEGETABLES AND FRUITS IN JHARKHAND**

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*In addition to supplying food, nutrition, and financial stability, vegetables also produce greater returns per unit area, which is essential for Indian agriculture as well as Jharkhand agriculture. Vegetables also have a better productivity, a quicker maturation cycle, a high value and a bigger earning potential, all of which contribute to improved livelihoods. In terms of global vegetable output, it comes in second place after China. According to the Department of Agriculture, Animal Husbandry & Co-operative, Government of Jharkhand and the Directorate of Agriculture, GOJ. Jharkhand produced 3592.03 thousand MT (vegetables) and 1141.5 thousand MT (fruits) in 2019-20 and 3741.38 thousand MT (vegetables) and 1196.3 thousand MT (fruits) in 2020-21. This paper has been attempted to analyse the growth of area, production and productivity of major vegetables and fruits in Jharkhand and to comparative study the growth of cultivable area, production and productivity between major vegetables and fruits in Jharkhand.*

**Keywords:** Major Vegetables, Major Fruits, Cultivated Area, Production, Productivity and Growth.

### **INTRODUCTION**

Horticulture's transition from rural to commercial production is the most important development of the past ten years and this new environment has spurred private sector investment in production system management. Micro irrigation, precision farming, greenhouse production, and enhanced post-harvest management, among other technical advancements, have had a significant influence on development over the past ten years, but many problems have sprung up in the process. Vegetable in India in common usage, a vegetable is any component of a plant that is eaten by people. The word "vegetable" is fairly arbitrary and is mostly determined by gastronomic and cultural habit. As a plentiful and affordable source of vitamins and minerals, vegetables play a significant role in the diet of Indian consumers, the majority of whom are vegetarians out of choice or access issues. This steady fast vegetarianism, together with increased per capita wealth, is causing vegetable consumption to increase quickly. Increasing vegetable demand is thought to benefit small holder farmers in India, who make up the majority of the country's agricultural sector. About half of all fruits and vegetables are produced on small holdings, which make up 78% of all holdings and 33% of the total land (Singh et al., 2002). Vegetable cultivation requires a lot of labour, and smallholders have access to a lot of labour. This gives small holders a particular edge in the production of vegetables. Also, because most vegetables have short harvest cycles, they offer returns throughout the year. Notwithstanding these benefits, there are still a number of challenges for small holders when it comes to growing vegetables. Because of the significant output losses brought on by pests, there are significant dangers to productivity. Around 30% of the total vegetable yield is thought to be produced by them (Alam, 2001).

"Fruits and vegetables (F&V) are considered in dietary guidance because of their high concentrations of dietary fiber, vitamins, minerals, especially electrolytes; and more recently phytochemicals, especially antioxidants" . Various reviews have associated low intake of fruits and vegetables with chronic diseases such as cardiovascular diseases, blood pressure, hypercholesterolemia, osteoporosis, many cancers, chronic obstructive pulmonary diseases, respiratory problems as well as mental health. Despite an increasing focus on the health benefits of fruits and vegetables, their consumption is below the recommended intake among adults. Therefore, considering how nutritional related health problems have risen drastically globally, it seems critical that formal nutrition education aiming to increase knowledge and fruits and vegetables intake be given priority in health education programs and health promotion. This review provides an insight into the importance of fruits and vegetables as well as the benefits and progress of nutrition education in improving intake.

#### **REVIEW OF LITERATURE**

Maity and Basu (2009), the introduction of new crops, higher productivity through intercropping, mixed cropping, relay cropping, etc., as well as the amazing effects of vegetable farming and the incursion of vegetable crops into nontraditional locations. Although there are occasionally production gluts, the business has created jobs in farming, marketing, and food processing.

Surabhi Mittal (2007), Both local demand and a sizable amount of export demand from other countries stimulate the growth of horticultural crops in the country. Economic viability, particularly the fruits and vegetable products, has been a major driver of the shift in cropping patterns in India during the past 1.5 decades in favour of horticulture.

Kiranjot Sidhu et al., (2009), Area shifted away from paddy and wheat and towards other crops, particularly vegetables. However, as vegetable production is becoming a popular alternative, the area under vegetable crops expanded by 0.8% and 2.6% during the summer and rabi seasons, respectively.

Mondal et al. (2011), depicted the real-world situation of block-level vegetable growing in West Bengal's coastal region, which consists of 96 community development blocks with the most vulnerable agro-ecosystems mostly in the Sundarban region. It was discovered that more than 79.55% of farmers are cultivating vegetables on between 30 and 40 percent of their farmland. It's interesting to note that over 9% of farmers cultivate vegetables on more than 90% of their agricultural acreage.

Prasad Arvind (1993), have examined the costs of four essential vegetables in Ranchi and Jamshedpur and discovered that the price increases were disproportionately high because of the superior marketing expenses and much higher profit margins levied by the middlemen.

Suprakash-Pan, (2013), Such horticulture practises play a significant role in a developing economy by supplying food, nutrition, and economic security. More crucially, they also produce greater returns per unit space and time. Vegetable output, productivity, and area

have all increased gradually in West Bengal. According to a demand-supply study, all districts will be able to produce more veggies than are needed.

Pal et al., (2012), High value vegetables may be produced in this region due to favorable agro-climatic conditions, and farmers are increasingly using this cropping method to generate high net returns all year round from cultivating high value vegetables.

Dangi, B.P. (2021), in the hazaribag, Dumka and Ranchi districts of Jharkhand on agricultural and horticultural productions, marketed surplus, different channels, price variation and margins have been explained.

Ekka and Deogharia (2005) and Deogharia (2006), have also highlighted the problems of marketing e.g. high commission charges, transport and packing cost. Therefore, if the farmers do not get straightforwardly accessible market outlet where they can sell their produce at a moderately reasonable price, they will have small inducement to regard vegetable cultivation as a profitable occupation. Role of agriculture marketing is so important that it has encouraged the government to place particular emphasis on it.

Dangi, B.P. (2023), have examined horticulture production in Jharkhand undergone many changes since 2000. Many factors during study period different crops observed different impact on area under production, total production and productivity as well as growth rate. A significant changing is observed in case of high value crops. The farmers prefer high value crops through adoption of improved technology.

Joanne L. Slavin, Beate Lloyd (2012) Fruits and vegetables are universally promoted as healthy. The Dietary Guidelines for Americans 2010 recommend you make one-half of your plate fruits and vegetables. Myplate.gov also supports that one-half the plate should be fruits and vegetables. Fruits and vegetables include a diverse group of plant foods that vary greatly in content of energy and nutrients. Additionally, fruits and vegetables supply dietary fiber, and fiber intake is linked to lower incidence of cardiovascular disease and obesity. Fruits and vegetables also supply vitamins and minerals to the diet and are sources of phytochemicals that function as antioxidants, phytoestrogens, and antiinflammatory agents and through other protective mechanisms. In this review, we describe the existing dietary guidance on intake of fruits and vegetables. We also review attempts to characterize fruits and vegetables into groups based on similar chemical structures and functions. Differences among fruits and vegetables in nutrient composition are detailed. We summarize the epidemiological and clinical studies on the health benefits of fruits and vegetables. Finally, we discuss the role of fiber in fruits and vegetables in disease prevention.

Anuja Bhargva & Atul Bansal (2021), In agriculture science, automation increases the quality, economic growth and productivity of the country. The export market and quality evaluation are affected by assorting of fruits and vegetables. The crucial sensory characteristic of fruits and vegetables is appearance that impacts their market value, the consumer's preference and choice. Although, the sorting and grading can be done by human but it is inconsistent, time consuming, variable, subjective, onerous, expensive and easily

influenced by surrounding. Hence, an astute fruit grading system is needed. In recent years, various algorithms for sorting and grading are done by various researchers using computer vision. This paper presents a detailed overview of various methods i.e. preprocessing, segmentation, feature extraction, classification which addressed fruits and vegetables quality based on color, texture, size, shape and defects. In this paper, a critical comparison of different algorithm proposed by researchers for quality inspection of fruits and vegetables has been carried out.

Aditya Bahtiya & Dr. Neeraj (2023), Indian horticulture sector has been growing at a phenomenal pace, surpassing the crop sector and presently its production is around 307 million tonnes consisting of fruits (about 100 million tonnes) and vegetables (about 207 million tonnes). India is also the second larger producer of fruit and vegetables in the world after China. Fruit and vegetables are an elemental part of cuisines and play a vital role in providing fresh nutrition and healthy food to consumers of all ages around the world. These are highly perishable and have a very short life resulting in 20-30 percent post-harvest losses due to a lack of proper harvesting, processing and poor cold chain and storage facilities. Value addition is the easiest way to reduce these losses. The aim of doubling the farmers income cannot be fulfilled without the efficient post-harvest management of agri-horti crops. Processing and value addition not only help in minimizing the wastes but it will also create ample opportunities for employment and add several income avenues. Advances in processing technologies of fruit and vegetables will help to curb post-harvest losses and results in giving a boost to the food processing industries. This book chapter proposes to show the status of the processing industries, the need for processing, government initiatives, modern technologies, challenges, technological impact and alternatives for product development. The future tasks involve interdisciplinary and cross-border collaboration and the fruit and vegetables production and processing needs are global but their application will require different approaches in different regions.

Abebe Assefa Gobena (2018), Horticultural crops provide an abundant and inexpensive source of energy, body-building nutrients, vitamins and minerals. This review paper was aimed to recognize opportunities, constraints and potentials in Ethiopia for production of horticultural crops. Major opportunities and potentials existing in the country for production of horticultural were reviewed and described. Policies and incentives by the government to attract both foreign and domestic investors engaged in horticulture production were found to be attractive. Ethiopia has a comparative advantage in production of horticultural commodities on account its favorable climate, proximity to European and Middle Eastern markets and cheap labor. Low cost, disciplined and trainable Labor force and the size of its domestic market and the numerous river basins affording great potential for irrigation. The status of horticulture production including indigenous one and consumption in the country yet need further improvement. Recently, despite of the ups and downs observed, the demand for horticultural crops especially for export is increasing. In general, the drawback to this sector in Ethiopia mainly include social and cultural habits of the population like cereal



based food habit, dietary preferences for meat and other animal products, and distaste for vegetable crops, lack of consumer awareness, economic reasons of the local consumers, absence of nutrition intervention programmed using horticulture. However, due to perishable nature and biological nature of horticulture production process, horticulture productions are risky investment activities. The constraints of horticultural production including vegetables production could be categorized in to farmer related, institutional, natural and infrastructure related factors. The review of literatures, we can summarized that horticultural crop production in country have great potential and opportunity with the great demands in export as well as domestic consumption and plays crucial role in the Ethiopia economy but countries not using all the potential and opportunities from this sector , so that further understanding about Horticultural crops production and its important for the domestic use and export earnings , should be give attentions on new technology adoption and all stakeholder like farmer ,researcher, investor and government to the sector give emphasis to this sector.

#### **OBJECTIVE OF THE STUDY**

- ♦ To analyse the growth of area, production and productivity of major vegetables and major fruits in Jharkhand.
- ♦ To comparative study the growth of cultivable area, production and productivity between major vegetables and major fruits in Jharkhand.

#### **DATA AND METHODOLOGY**

The secondary data has been used, obtained from the Department of Agriculture, Animal Husbandry & Co-operative, Government of Jharkhand and The Directorate of Agriculture, GOJ and Economic Survey of Jharkhand, has been used to understand the growth of cultivable area, production and productivity of major vegetables in Jharkhand.

#### **RESULT AND DISCUSSION**

According to the department of agriculture, animal husbandry & co-operative, GOJ and the directorate of agriculture, GOJ Jharkhand produced 3592.03 thousand MT in 2019-20 and 3741.38 thousand MT in 2020-21. Cultivated area of total vegetables increased 305.88 thousand hectares in 20220-21 from 293.53 thousand hectares in 2016-17, similarly, production 3370 thousand MT to 3741.38 thousand MT and productivity 11.48 kg/hectare to 12.23 kg/hectare in 2016-17 to 2020-21 respectively. From temperate to humid tropics, and from sea level to snowline, India produces the most vegetables. Vegetables are a great source of vitamins, including niacin, riboflavin, Thiamine, and vitamins A and C. In addition to proteins and carbs, they also include minerals like calcium and iron. Vegetables are recognised to be the cheapest source of natural defence mechanisms and fight under nutrition. As most vegetables are short-duration crops, they integrate well into intensive cropping systems and may produce extremely high yields and extremely high returns on

investment for producers. The most common vegetables planted are potatoes, onions, tomatoes, cauliflower, cabbage, beans, cucumber and okra in India as well as Jharkhand.

**Table-01: Area of Major Vegetables in Jharkhand (in '000 Hectares)**

<b>Vegetables/Year</b>	<b>2016-17</b>	<b>2017-18</b>	<b>2018-19</b>	<b>2019-20</b>	<b>2020-21</b>
Beans	12.62	12.91	13.03	13.31	13.5
Brinjal	80.04	80.09	80.35	80.78	80.7
Cabbage	19.32	19.06	19.1	19.25	19.43
Cauliflower	21.18	21.93	21.99	22.14	22.28
Okra	4.83	5.39	5.63	6.07	7.47
Onion	17.48	17.16	17.99	19.77	17.59
Pea (Green)	15.19	15.73	15.93	15.93	16.35
Potato	52.72	48.21	49.03	48.88	49.13
Tomato	19.74	20.11	20.52	21.25	22.28
<b>Total (with remaining vegetables)</b>	<b>293.53</b>	<b>289.21</b>	<b>293.88</b>	<b>302.57</b>	<b>305.88</b>

**Source:** Department of Agriculture, Animal Husbandry & Co-operative, Government of Jharkhand

From the table-01, brinjal has maximum area covered all over the year from 2016-17 to 2020-21. But potato is the only one vegetables has decreased in 2020-21 from 2016-17 in the state of Jharkhand.

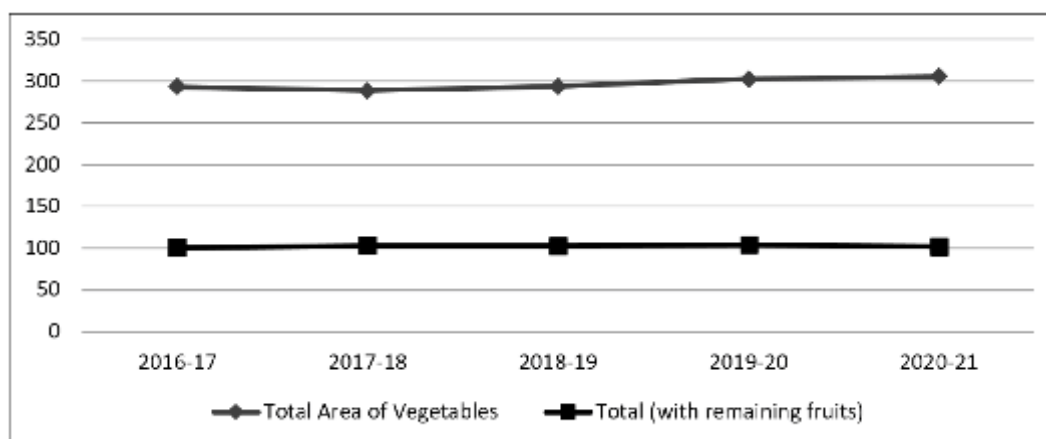
**Table-02: Area of Major Fruits in Jharkhand (in '000 Hectares)**

<b>Fruits/Year</b>	<b>2016-17</b>	<b>2017-18</b>	<b>2018-19</b>	<b>2019-20</b>	<b>2020-21</b>
Banana	9.1	9.2	9.2	5.6	5.6
Guava	8.2	8.3	8.5	8.8	8.8
Jackfruit	14.7	14.7	14.9	15.2	15.0
Litchi	7.0	4.1	4.8	4.2	4.1
Mango	50.6	54.5	54.7	57.2	55.4
Papaya	2.5	2.7	2.7	2.8	2.9
Lime & Lemon	5.6	7.2	5.1	7.3	7.1
<b>Total (with remaining fruits)</b>	<b>100.8</b>	<b>103.4</b>	<b>103.1</b>	<b>104.3</b>	<b>102.1</b>

**Source:** Department of Agriculture, Animal Husbandry & Co-operative, Government of Jharkhand

From the table-02, mango has maximum area covered all over the year from 2016-17 to 2020-21. But banana and litchi are two fruits has decreased in 2020-21 from 2016-17 in the state of Jharkhand.

**Figure-01 : Trends Line of Area of Vegetables and Fruits in Jharkhand (in '000 Hectares)**



**Source:** Compiled data

Figure-01 shows that the trend line of area of vegetables and fruits Jharkhand (in '000 Hectares) from 2016-17 to 2020-21. In 2016-17 area covered 293.53 thousand hectares (total vegetables) and 100.8 thousand hectares (total fruits) which increased 305.88 thousand hectares (total vegetables) and 102.1 thousand hectares (total fruits) in 2020-21 under the state of Jharkhand.

**Table-03: Production of Major Vegetables in Jharkhand ( in '000 MT)**

Vegetables/Year	2016-17	2017-18	2018-19	2019-20	2020-21
Beans	226.71	191.18	193.32	199.03	199.88
Brinjal	240.99	252.6	256.72	268.69	270.19
Cabbage	322.45	326.22	321.74	328.19	325.34
Cauliflower	292.17	299.64	302.42	309.76	308.63
Okra	101.46	92.15	94.51	100.53	109.74
Onion	292.58	289.04	289.66	293.27	295.57
Pea (Green)	341.88	347.14	349.68	354.35	355.72
Potato	668.65	690.23	695.46	705.63	767.19
Tomato	231.45	265.26	271.04	277.19	276.05
<b>Total (with remaining vegetables)</b>	<b>3370</b>	<b>3475.2</b>	<b>3507.32</b>	<b>3592.03</b>	<b>3741.38</b>

**Source:** Department of Agriculture, Animal Husbandry & Co-operative, Government of Jharkhand

From the table-03, potato has maximum area covered all over the year from 2016-17 to 2020-21. But beans is the only one vegetables in my study has area covered decreased in 2020-21 from 2016-17 in the state of Jharkhand.

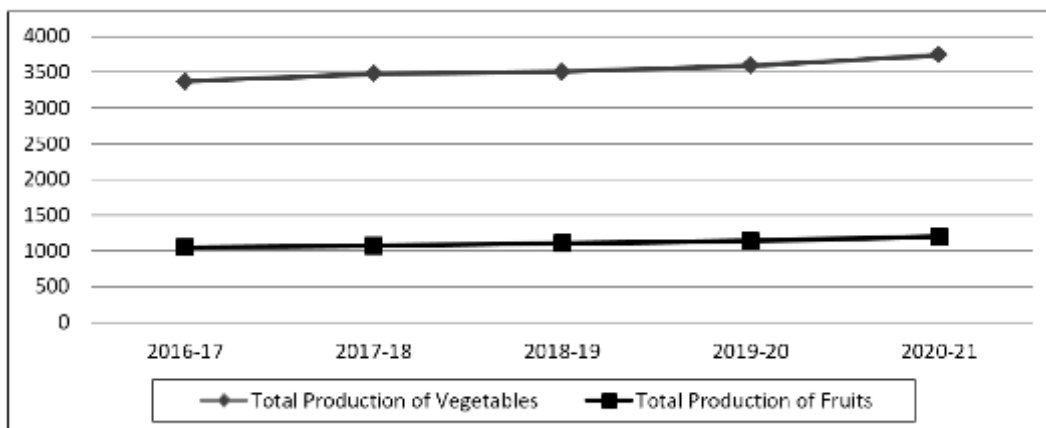
**Table-04: Production of Major Fruits in Jharkhand (in '000 MT)**

Fruits/Year	2016-17	2017-18	2018-19	2019-20	2020-21
Banana	31.6	32.1	32.8	31.1	32.9
Guava	88.8	89.3	90.8	95.1	94.7
Jackfruit	124.8	137.9	140.9	166.1	199.7
Litchi	47.8	65.0	72.1	65.4	64.8
Mango	438.5	435.9	432.6	437.4	452.7
Papaya	109.9	116.4	117.2	119.5	126.2
Lime & Lemon	54.0	54.6	83.3	88.6	86.5
<b>Total (with remaining fruits)</b>	<b>1048.0</b>	<b>1070.1</b>	<b>1106.7</b>	<b>1141.5</b>	<b>1196.3</b>

**Source:** Department of Agriculture, Animal Husbandry & Co-operative, Government of Jharkhand

From the table-04, mango has maximum produced all over the year from 2016-17 to 2020-21 and production of all fruits in my study has increased in 2020-21 from 2016-17 in the state of Jharkhand.

**Figure-02: Trend Line of Production of Vegetables and Fruits in Jharkhand (in '000 MT)**



**Source:** Compiled data

Figure-02 shows that the trend line of production of vegetables and fruits in Jharkhand (in '000 MT) from 2016-17 to 2020-21. In 2016-17 production 3370 thousand MT (total vegetables) and 1048.0 thousand MT (total fruits) which increased 3741.38 thousand MT (total vegetables) and 1196.3 thousand MT (total fruits) in 2020-21 under the state of Jharkhand.

**Table-05: Productivity of Major Vegetables in Jharkhand (in Kg./Hectare)**

<b>Vegetables/Year</b>	<b>2016-17</b>	<b>2017-18</b>	<b>2018-19</b>	<b>2019-20</b>	<b>2020-21</b>
Beans	17.96	14.81	14.84	14.95	14.81
Brinjal	3.01	3.15	3.20	3.33	3.35
Cabbage	16.69	17.12	16.85	17.05	16.74
Cauliflower	13.79	13.66	13.75	13.99	13.85
Okra	21.01	17.10	16.79	16.56	14.69
Onion	16.74	16.84	16.10	14.83	16.80
Pea (Green)	22.51	22.07	21.95	22.24	21.76
Potato	12.68	14.32	14.18	14.44	15.62
Tomato	11.72	13.19	13.21	13.04	12.39
<b>Total (with remaining vegetables)</b>	<b>11.48</b>	<b>12.02</b>	<b>11.93</b>	<b>11.87</b>	<b>12.23</b>

**Source:** Department of Agriculture, Animal Husbandry & Co-operative, Government of Jharkhand

From the table-05, pea (green) has maximum productivity all over the year from 2016-17 to 2020-21 and most of the vegetables in my study have productivity increased. But beans, okra and pea (green) have productivity decreased in 2020-21 in the state of Jharkhand.

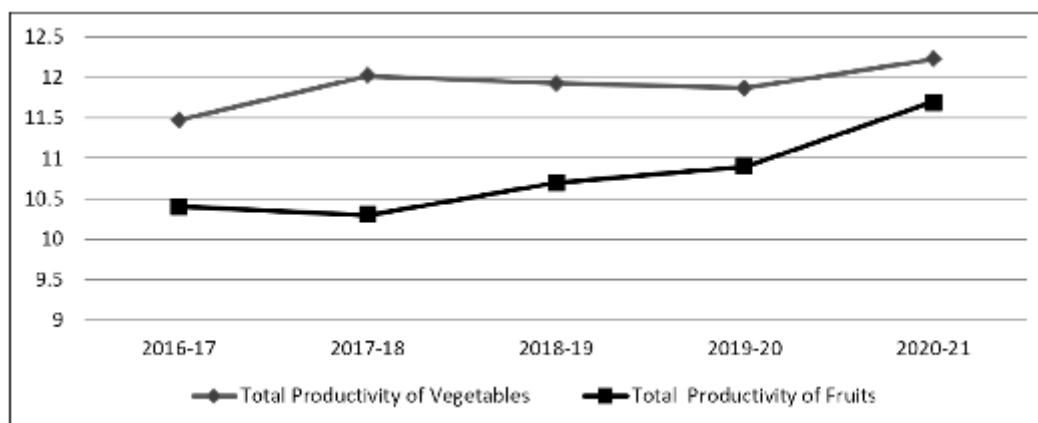
**Table-06: Productivity of Major Fruits in Jharkhand (in Kg./Hectare)**

<b>Fruits/Year</b>	<b>2016-17</b>	<b>2017-18</b>	<b>2018-19</b>	<b>2019-20</b>	<b>2020-21</b>
Banana	3.5	3.5	3.6	5.6	5.9
Guava	10.8	10.8	10.7	10.8	10.8
Jackfruit	8.5	9.4	9.5	10.9	13.3
Litchi	6.8	15.9	15.0	15.6	15.8
Mango	8.7	8.0	7.9	7.6	8.2
Papaya	44.0	43.1	43.4	42.7	43.5
Lime & Lemon	9.6	7.6	16.3	12.1	12.2
<b>Total (with remaining fruits)</b>	<b>10.4</b>	<b>10.3</b>	<b>10.7</b>	<b>10.9</b>	<b>11.7</b>

**Source:** Department of Agriculture, Animal Husbandry & Co-operative, Government of Jharkhand

From the table-06, papaya has maximum productivity all over the year from 2016-17 to 2020-21 and productivity of most of the fruits in my study have increased. But productivity of mango and papaya have decreased in 2020-21 in the state of Jharkhand.

**Figure-03: Trend Line of Productivity of Vegetables and Fruits in Jharkhand (in Kg./hectares)**



**Source:** Compiled data

Figure-03 shows that trend line of productivity of vegetables and fruits in Jharkhand (in kg./hectares) from 2016-17 to 2020-21. In 2016-17 productivity 11.48 kg/hectares (total vegetables) and 10.4 kg/hectares (total fruits) which increased 12.23 kg/hectares (total vegetables) and 11.7 kg/hectares (total fruits) in 2020-21 under the state of Jharkhand.

From the above discussion we can say that there is few differences in area covered, production and productivity in vegetables and fruits during last five years in the state. So, it is important to improve the system for cultivation and technological progress.

## CONCLUSION

Vegetables and fruits being a rich and cheap source of vitamins and minerals, occupy an important place in the food basket of Indian consumers, a majority of whom are vegetarian by either choice or lack of access. In addition, vegetables have higher productivity, shorter maturity cycle, are high in value and provide greater income leading to improved livelihoods. In Jharkhand, major vegetables (beans, brinjal, cabbage, cauliflower, okra, onion, pea, potato and tomato) cultivable area is increased in 2020-21 from 2016-17. Major vegetables production is also increased in 2020-21 from 2016-17 but beans has decreased. Some vegetables productivity increased and some vegetables (beans, brinjal, cauliflower, onion and tomato) productivity decreased in Jharkhand.

In Jharkhand, major fruits (guava, jackfruit, mango, papaya and lime & lemon) cultivable area is increased in 2020-21 from 2016-17. Major fruits production is also increased in 2020-

21 from 2016-17 and only two fruits (mango and papaya) productivity decreased but most of the fruits in my study have increased in Jharkhand. Mango has emerged as the most important fruit in the state of Jharkhand. It occupies almost half of the area (55.4 thousand hectares), 40 percent (452.7 thousand MT) of the total output under fruit production in the year 2020-21. Banana and jackfruit are the two other important fruits in terms of area under cultivation, as well as production but papaya and litchi in terms of productivity.

Vegetables and fruits are grown, has increased from 293.53 thousand hectares (vegetables) and 100.8 thousand hectares (fruits) in 2016-17 to 305.7 thousand hectares (vegetables) and 102.1 thousand hectares (fruits) in 2020-21. Although this increase has not been steady but an overall increased area of production is an indicator of the diversification in agriculture as well as horticulture. There has been a steady increase in the production of vegetables in Jharkhand since 2016-17. The production of vegetables and fruits has increased from 3370 thousand MT (vegetables) and 1048.0 thousand MT (fruits) in 2016-17 to 3741.4 thousand MT (vegetables) and 1196.3 thousand MT (fruits) in 2020-21. However, there was a slight decline in the production in 2017-18 but thereafter the production has increased steadily. According to Jharkhand economic survey 2021-22 the major vegetables on the basis of production in Jharkhand are cabbage, cauliflower, brinjal, potato, tomato, pea (green) and radish. Cabbage, cauliflower, brinjal, tomato and radish are produces under every season in Jharkhand but fruits are produces under seasonal in the state.

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