



# MAJOR VEGETABLE CROPS IN MANIPUR : AN ANALYSIS OF GROWTH IN AREA, PRODUCTION, AND PRODUCTIVITY WITH SPECIAL REFERENCE TO BISHNUPUR DISTRICT, MANIPUR, INDIA

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## Abstract

Growth rate in area and production of the selected vegetable crops in the state of Manipur and Bishnupur district were found to be positive. The growth in area and production of pea was the highest and that of cauliflower the lowest. In terms of scale of production, cabbage was found to be the single largest vegetable crop produced in Manipur. The study also revealed that the growth in production of vegetables during this period of study was found to be mostly on account of the increase in area of cultivation rather than increase in productivity.

**Key words :** Growth rates, vegetables, area, production, Bishnupur district, Manipur state.

## Introduction

With rising demand for India's horticultural produces in countries like Saudi Arabia, UAE, Nepal, Bhutan, Sri Lanka and Bangladesh, India has been able to mark a significant presence in the international market. According to 'Horticultural Statistics at a Glance 2017', India's total area under horticulture grew by about 3% per annum and annual production increased by 5.4%. During 2016-17, the production of horticulture crops was about 295.3 million metric tonnes from an area of 24.9 million hectare. The production of vegetables has increased from 58.5 million metric tonnes to 175 million metric tonnes since 1991-92 to 2016-17 (2nd Estimate). The percentage share of horticultural output in agricultural output is about 30%, and fruits and vegetables account for more than 90% of the total horticultural production in the country.

India's productivity in fruits and vegetables sector (12.38 tonnes per hectare and 14.87 tonnes per hectare, respectively) is at par to the world's productivity in fruits and vegetables sector (11.78 tonnes per hectare and 19.10 tonnes per hectare, respectively). Today, India has become the second largest producer of fruits and vegetables in the world.

For Manipur, which is a small, landlocked, north-eastern state of India, the production share of vegetables out of the total fruit and vegetable crops production in the state has increased from about 26% in 2005-06 to about 40% in 2015-16, but it is still smaller compared to the national production share of vegetables, which has been consistently above 64% during the same period.

Out of the total vegetable production in 2015-16, about 66% were produced in the valley region with Bishnupur district as the state's leading vegetable producer. Vegetables occupied a total area of 34.16 thousand hectares with an average annual production of 315.00 thousand metric tonnes, which accounted for just 0.34% and 0.19% over the national figures, respectively. The state productivity in vegetables, which is 9.22 metric tonnes per hectare is quite low as compared to the national average of 16.73 metric tonnes per hectare.

However, increasing trends in area and production observed since 2000-01 shows that great potentialities exist for fruits and vegetable sector in the state of Manipur. This is not to say that there were no fluctuations during this entire period as you can see from figs. 1(a), 1(b), 2(a) and 2(b), which show the area and production trends of fruits and vegetables in Manipur, respectively.

**Table 1 :** Growth in area, production and productivity of major vegetables in Manipur (2005-06 to 2015-16).

Vegetable crops	Area ('000 ha)				Production ('000 MT)				Productivity (MT/ha)			
	SD	Mean	CV%	CGR%	SD	Mean	CV%	CGR%	SD	Mean	CV%	CGR%
<b>Cauliflower</b>	0.58	2.23	26.07	8.16	7.42	22.57	32.86	10.53	0.82	9.94	8.25	2.19
<b>Cabbage</b>	2.18	5.13	42.51	14.84	24.71	60.25	41.01	14.06	1.23	11.99	10.23	-0.68
<b>Pea</b>	1.98	4.04	49.06	18.77	21.73	39.34	55.25	20.04	1.24	9.35	13.29	1.07
<b>Tomato</b>	1.60	2.59	61.93	8.39	15.88	26.32	60.33	8.65	1.27	10.22	12.38	0.24
<b>Others</b>	2.34	5.82	40.26	15.49	18.45	47.28	39.02	20.98	1.95	8.06	24.19	4.76

The coverage of cabbage was the highest with 8.06 thousand hectares which accounts for about 23.59% of the total coverage of vegetable in the state followed by pea, tomato, cauliflower, onion and okra, which were 23.57%, 8.97%, 8.79%, 1.24% and 0.63%, respectively. In terms of production, the percentage share of cabbage was the highest with 30.78%, followed by pea, cauliflower, tomato onion and okra with 25.56%, 10.33%, 10.19%, 1.60%, 0.69% and 0.50% of the total vegetable production in Manipur, respectively.

As per the data from the Department of Horticulture and Soil Conservation, Manipur, the coverage of vegetables in the year 2015-16 was highest in Senapati district with 7.83 thousand hectares and Bishnupur district was second with 6.34 thousand hectares, which were 22.93% and 18.55% of total area under vegetables in the state, respectively, followed by Thoubal (14.66%) and Imphal West (13.53%) while Chandel district had the smallest area under vegetable, which was only 4.09% of the total area under vegetable in Manipur. In terms of production, Bishnupur district was the largest producer of vegetables in the state with 68.62 thousand metric tonnes which was 21.79% of the production in the state, followed by Thoubal (17.12%), Imphal West (15.20%), and Imphal East (11.99%). The productivity of Bishnupur district (10.83 tonnes per hectare) in vegetable is higher than the state average productivity of vegetable (9.22 tonnes per hectare).

Manipur is suitable for the development of fruits and vegetable sector due its varied agro-climatic conditions. There is ample scope for fruit and vegetable cultivation in the state. However, due to inadequate irrigation facility, the state's agriculture is heavily dependent on the vagaries of monsoon and often subjected to the uncertain climatic conditions resulting in severe fluctuation in the level of production. Horticulture crops like vegetables do not require perennial irrigation. They are short duration crops and give higher yield per unit area as compared to cereal crops like paddy thus giving higher returns to the small and marginal farmers in Manipur who have taken up vegetable cultivation. Moreover, it is also a source of

intensive employment due to its nature of involvement of labour. Now, the produce from this sector can act as a catalyst for growth by providing raw material support to the newly developing small scale agro-based local business units in the state. In short, this sector has become one of the most significant and vibrant components of the agricultural sector in the state.

Considering the huge importance and the potential for the fruits and vegetables sector to improve the overall economy of the state, the present study was taken up with the main objective to analyse the growth and variability in area, production and productivity of the vegetable sector in the state.

## Materials and Methods

The present study makes use of secondary data on area and production of vegetable crops in Manipur collected from the Department of Horticulture & Soil Conservation, Manipur. The scope of the study is limited to Manipur State and Bishnupur district. The study is restricted to a time bound period of ten years from 2005-06 to 2015-16. The data has been analyzed using statistical tools like Coefficient of Variation (CV) and Compound Growth Rate (CGR).

## Results and Discussion

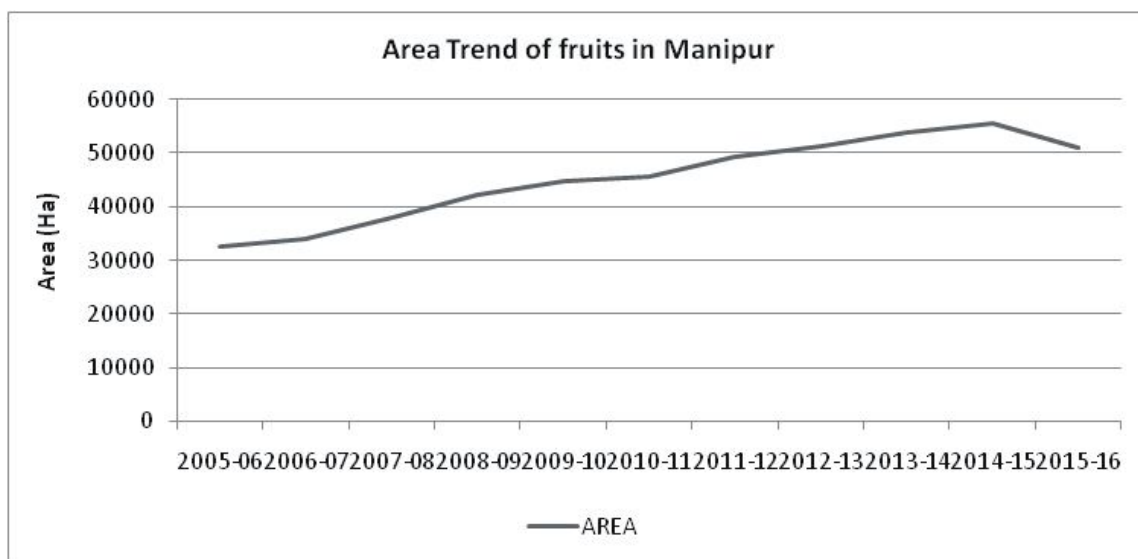
The results of Mean, Standard Deviation, Coefficient of Variation and Compound Growth Rates of area, production and productivity of total vegetable and selected individual vegetable crops (namely cauliflower, cabbage, tomato and pea) of Manipur state and Bishnupur district are presented in this paper.

### Vegetable crops in Manipur

The growth in area, production and productivity of major vegetable crops in Manipur for the period 2005-06 to 2015-16 is presented in table 1.

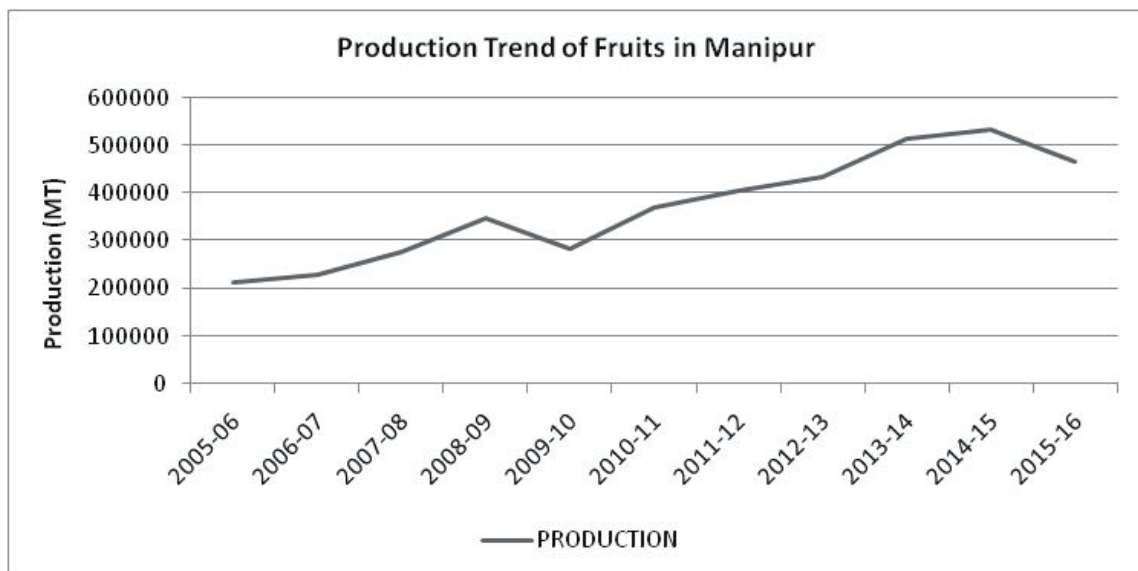
### Area

The highest rate of increase in area was observed in the case of pea, which was 18.77% per annum as compound growth rate followed by cabbage, tomato and cauliflower, which grew at the rate of 14.84%, 8.39%



Source: Directorate of Horticulture and Soil Conservation, Manipur

**Fig. 1 (a) :** Area trend of fruits in Manipur.



Source: Directorate of Horticulture and Soil Conservation, Manipur

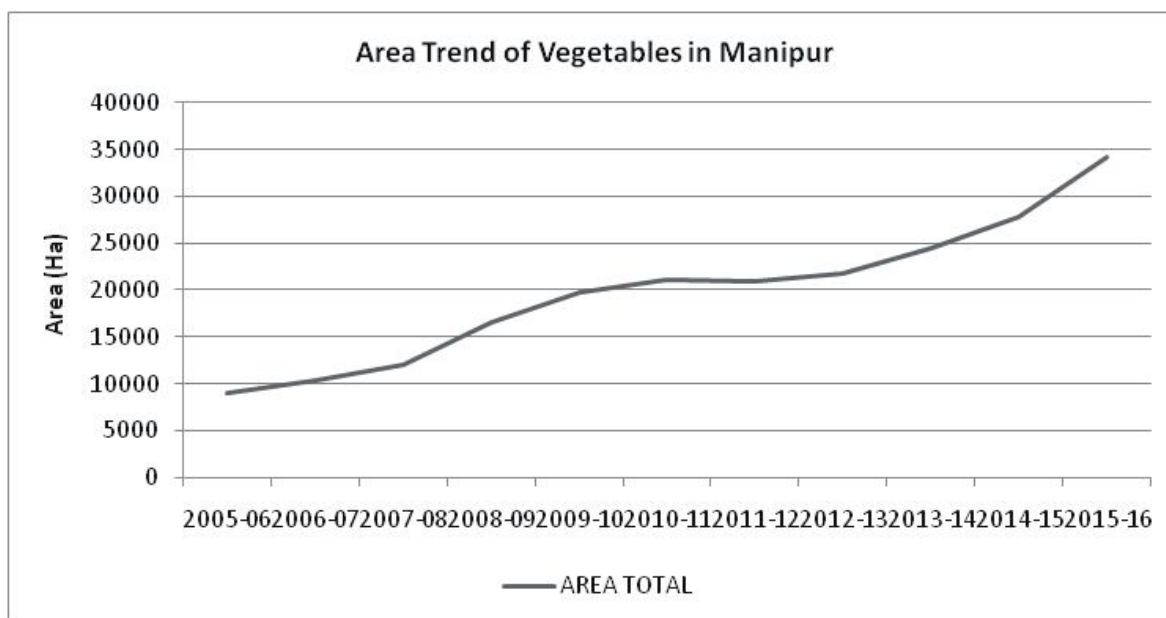
**Fig. 1 (b) :** Production trend of fruits in Manipur.

and 8.16%, respectively. The mean area under cabbage was observed to be highest with 5.13 thousand hectares followed by pea, tomato and cauliflower with 4.04 thousand hectares, 2.59 thousand hectares and 2.23 thousand hectares, respectively. The variability in area appears to be maximum in cabbage (2.18 thousand hectares) followed by pea (1.98 thousand hectares), tomato (1.60 thousand hectares) and cauliflower (0.58 thousand hectares). The coefficient of variation shows more than 61%, 49%, 42% and 26% of variation in areas under tomato, pea, cabbage and cauliflower respectively.

### Production

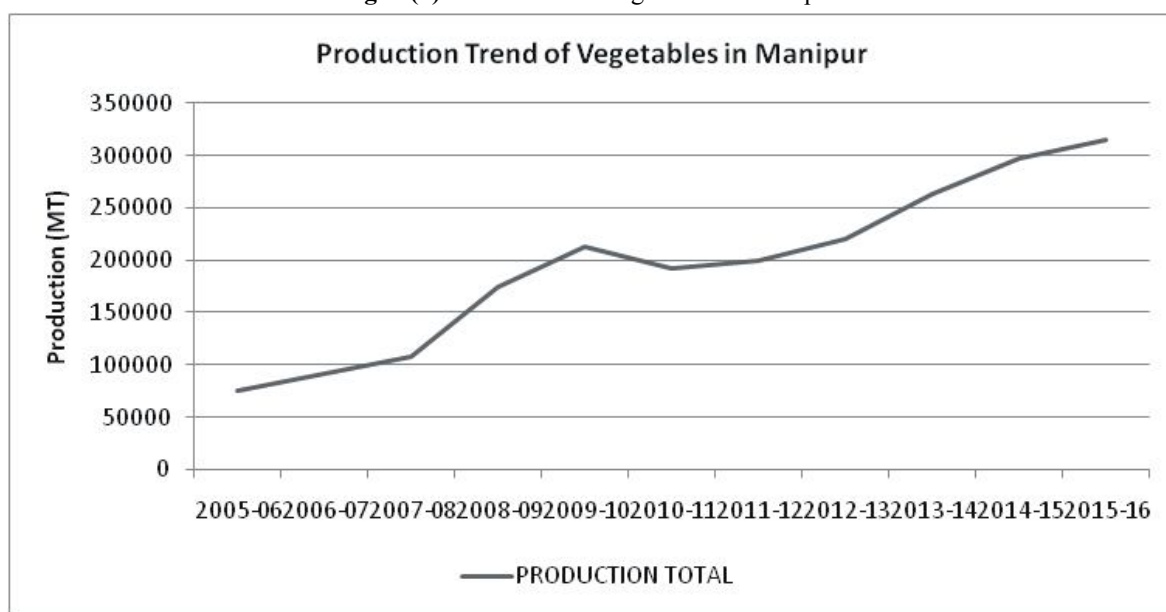
In terms of production, the compound growth rate

during the period 20105-06 to 2015-16 was observed maximum in pea, which was 20.04% per annum followed by cabbage, cauliflower and pea with growth rates of 14.06%, 10.53% and 8.65%, respectively. During this period, the mean production under cabbage was found to be highest with 60.25 thousand metric tonnes followed by pea, tomato and cauliflower with 39.34 thousand metric tonnes, 26.32 thousand metric tonnes and 22.57 thousand metric tonnes. The variability in production appears to be maximum in cabbage (24.71 thousand metric tonnes) followed by pea (21.73 thousand metric tonnes), tomato (15.88 thousand metric tonnes) and cauliflower (7.42 thousand metric tonnes). The coefficient of variation shows more than 60%, 55%, 41% and 32% variation in



Source: Directorate of Horticulture and Soil Conservation, Manipur

**Fig. 2 (a) :** Area trend of vegetables in Manipur.



Source: Directorate of Horticulture and Soil Conservation, Manipur.

**Fig. 2 (b) :** Production trend of vegetables in Manipur.

production of tomato, pea, cabbage and cauliflower.

### Productivity

The overall compound growth rate in productivity was seen to be highest in cauliflower which was 2.19% followed by pea (1.07%) and tomato (0.24%) while negative compound growth rate was observed in cabbage. The mean productivity of cabbage was highest with 11.99 metric tonnes per hectare. The maximum variability in productivity was observed in tomato (1.27 tonnes per hectare) and minimum in cauliflower (0.82 tonnes per hectare). The coefficient of variation shows more than

13%, 12%, 10% and 8% of variation in productivity of pea, tomato, cabbage and cauliflower.

### Vegetable crops in Bishnupur district

The growth in area, production and productivity of major vegetable crops in Bishnupur district for the period 2005-06 to 2015-16 is presented in table 2.

### Area

Among the selected vegetables, the highest rate of increase in area was observed in the case of pea, which was 20.42% per annum as compound growth rate

**Table 2 :** Growth in area, production and productivity of major vegetables in Bishnupur district (2005-06 to 2015-16).

Vegetable crops	Area ('000 ha)				Production ('000 MT)				Productivity (MT/ha)			
	SD	Mean	CV%	CGR%	SD	Mean	CV%	CGR%	SD	Mean	CV%	CGR%
<b>Cauliflower</b>	0.08	0.46	18.44	5.43	1.23	4.66	26.37	8.21	0.87	10.01	8.65	2.63
<b>Cabbage</b>	0.34	0.92	37.22	12.14	3.98	10.92	36.47	11.30	1.22	12.09	10.08	-0.75
<b>Pea</b>	0.44	0.74	59.85	20.42	5.11	7.44	68.66	20.42	1.37	9.78	14.03	-0.01
<b>Tomato</b>	0.19	0.57	33.51	6.26	1.99	5.91	33.75	6.39	1.30	10.49	12.39	0.12
<b>Others</b>	0.35	0.74	47.30	14.83	3.64	6.30	57.73	24.26	1.79	8.25	21.69	8.21

**Table 3 :** Comparative Growth in Area, Production and Productivity of Vegetables in Bishnupur district and Manipur (2005-06 to 2015-16).

Particulars	Bishnupur district			Manipur		
	Area ('000 ha)	Production ('000 MT)	Productivity (MT/ha)	Area ('000 ha)	Production ('000 MT)	Productivity (MT/ha)
<b>SD</b>	1.26	14.72	0.79	7.57	79.63	0.87
<b>Mean</b>	3.42	35.23	10.17	19.81	195.75	9.74
<b>CV%</b>	36.80	41.80	7.78	38.21	40.68	8.97
<b>CGR%</b>	12.69	13.92	1.09	14.22	15.32	0.97

followed by cabbage, tomato and cauliflower, which grew at 12.14%, 6.26% and 5.43%, respectively. The mean area under cabbage was observed to be highest which was 0.92 thousand hectares followed by pea, tomato and cauliflower, which were 0.74 thousand hectares, 0.57 thousand hectares and 0.46 thousand hectares, respectively. The variability in area appears to be maximum for pea (0.44 thousand hectares) followed by cabbage (0.34 thousand hectares), tomato (0.19 thousand hectares) and cauliflower (0.08 thousand hectares). The coefficient of variation shows more than 59%, 37%, 33% and 18% of variation in areas under pea, cabbage, tomato and cauliflower, respectively.

### Production

In terms of production, the maximum growth rate was observed in pea, which was 20.42% per annum as compound growth rate followed by cabbage, cauliflower and tomato which grew at the rate of 11.30%, 8.21% and 6.39%, respectively. During this period, the average production under cabbage was found to be highest with 10.92 thousand metric tonnes followed by pea, tomato and cauliflower with 7.44 thousand metric tonnes, 5.91 thousand metric tonnes and 4.66 thousand metric tonnes. The variability in production appears to be maximum for pea (5.11 thousand metric tonnes) followed by cabbage (0.398 thousand metric tonnes), tomato (1.99 thousand metric tonnes) and minimum for cauliflower (1.23 thousand metric tonnes). The coefficient of variation shows more than 68%, 36%, 33% and 26% of variation in production of pea, cabbage, tomato and cauliflower.

### Productivity

The overall compound growth rate in productivity was seen to be highest in cauliflower which was 2.63% while negative compound growth rates were observed in cabbage and pea. The mean productivity of cabbage was highest with 12.09 tonnes per hectare. While the maximum variability in productivity was observed in pea (1.39 tonnes per hectare), it was the minimum in cauliflower (0.87 tonnes per hectare). The coefficient of variation shows more than 14% and 10% variation in productivity in pea and cabbage, respectively.

### Comparison between Bishnupur district and Manipur

Table 3 shows the comparative growth in area, production and productivity of vegetables in Bishnupur district and Manipur for the period 2005-06 to 2015-16. The compound growth in area and production of vegetables in Manipur (14.22% and 15.32% respectively) were slightly higher than the growth figures in area and production of vegetables in Bishnupur district (12.69% and 13.92%, respectively) whereas the growth in productivity of vegetable crops of Bishnupur district was higher than that of the state. The coefficient of variation shows that the variation in area and productivity was slightly higher in the case of Manipur which were more than 38% and 8% respectively as compared to that of Bishnupur district which were more than 36% and 7% respectively and at the same time, the variations in production were also found to be more than 41% in Bishnupur district and 40% in Manipur state.

## Conclusion

The study showed a positive growth rate in area and production of all the selected vegetable crops in Manipur as well as in Bishnupur district. Among the selected crops, the maximum growth in area and production was observed in pea for both Manipur and Bishnupur district. In terms of scales of production, cabbage and pea were the two largest vegetable crops, which accounted for more than 50% of the total vegetable production in the state.

The high variability in area and productivity in all the vegetable crops certainly bears an adverse effect on the overall level of vegetable production. The minimal growth in the overall productivity in Manipur state and Bishnupur district (1.09% and 0.95%, respectively) indicated that the increase in production of vegetables during the period of study was mostly on account of increase in area of cultivation under vegetable. Therefore, to meet the rising demand for vegetables by the ever increasing population in the state, there is a pressing need to boost productivity

by making required investment on providing accessibility to the farmers, high quality seeds, production techniques, irrigation, transportation, communication and marketing facilities in the state and district levels.

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