

PRESENT STATUS AND FUTURISTIC VIEW OF HORTICULTURE IN WEST BENGAL

Jadab Chandra Halder* and Dr. Pannalal Das**

ABSTRACT

The growth and prosperity of rural economy are closely linked with agriculture and allied agricultural sectors. Apart from meeting the food and fodder requirements, its importance also stems from the raw materials that it provides to industry. With increasing population and inadequate employment generation, the pressure on land has increased considerably leading to fragmentation of land. As the pressure on land increased, the farmers are forced to exploit their land for livelihood support which again leads to environmental degradation and degradation of soil health that would lead to food and nutritional insecurity endangering in particular the livelihood of future generation. Allied sector is now equally important for the development of the state especially its rural economy and all round development of any country. Horticulture is an important allied sector of agriculture, which provides supplementary income, alternative livelihood especially to the landless, employment opportunities during non- agricultural seasons. Besides this, it contributes immensely in value added services and food processing industries. This sector has an ability to create man hours and entrepreneurship among the youth. Consumer demand of horticultural crops is increasing day by day as the quality of life has increased in urban and peri-urban areas. The state of West Bengal has immense potentiality to meet these demands on account of its diverse climatic conditions. In this context, this paper attempts to analyse the changing nature of horticulture in West Bengal and find out the projected requirement and production of major horticultural crops for the year of 2020-2021.

Key Words: *Horticulture, Sustainability, Land Fragmentation, AEZ.*

INTRODUCTION

West Bengal is located between 21°10' N and 27°38' N latitude and 85°50' E and 89°50' E longitude. The state is flanked by the Bay of Bengal in the south, Sikkim and Bhutan on the north, Assam and Bangladesh on the east and Jharkhand and Orissa on the west. It covers an area of 87.616 sq.km. representing only 2.7% of the total area of the country. The state is divided into 19 administrative districts viz. Darjeeling, Jalpaiguri, Cooch Behar, Uttar Dinajpur, Dakshin Dinajpur, Malda, Murshidabad, Nadia, North 24 Parganas, South 24 Parganas, Kolkata, Howrah Hooghly, Burdwan, Birbhum, Bankura, Purba Medinipur, Paschim Medinipur, and Purulia. Kolkata is excluded in this study because of its non availability of agricultural areas. The state is situated in almost the heart of fertile Gangetic delta and possesses high geographical diversity with six agro-climatic zones. Horticultural crops cover 21% of the net cultivable area in the state (Economic Review, 2011-2012). The state offers scope for cultivation of a wide variety of horticultural crops such as fruits, vegetables, spices, plantation crops, medicinal and aromatic plants, flowers and ornamentals because of its diversities in topography, altitude, climatic and soil conditions. Despite the favourable factors and scope for the cultivation of horticultural crops, the development of horticulture has not picked up momentum as desired. The productivity of horticultural crops is very low in the state. This paper describes the present status of two major horticultural crops viz. fruits and vegetables, major constraints of their cultivation and future strategies for development of horticulture to ensure sustainable horticultural production.

OBJECTIVES OF THE STUDY:

- To examine the present status and prospect of horticulture in West Bengal by considering the views of different comprehensive District Agricultural Plan, State Agricultural Plan, State Agriculture Commission, State Planning Board and different departments of Government of West Bengal.
- To prepare a suitability calendar in respect of some important climatic characteristics and soil factor for different horticultural crops which will help the farmers for adoption of location specific horticultural crops.
- To compute the district –wise projected production of important horticultural crops for the year of 2020-2021

*Research Fellow, Department of Geography, Calcutta University

**Professor, Department of Geography, Calcutta University

DATA SOURCE AND METHODOLOGY

For the analysis of present status and growth of fruits and vegetables, authors have considered a period of six years from 2005-2006 to 2010-2011. The data of this study have been collected from different government published sources. Different Statistical Abstracts published by Bureau of Applied Economics and Statistics (BAE&S) of Government of West Bengal are the main sources. Statistical Appendix of Economic Reviews of successive years published by Government of West Bengal, State Agricultural Plan for West Bengal, prepared by Social Organization for Integrated Living (SOIL) and National Horticultural Mission (NHM)-2005 by Ministry of Agriculture, Government of India are the other sources.

Growth of different horticultural crops (fruits and vegetables) is first examined and then the projected productions of horticultural crops are calculated for the year of 2020-2021 with the help of following equation (Kothari, 2011).

$$Y_c = a + bx \dots \dots \dots (i)$$

Where Y_c = Estimated value of production of a particular year (x).

Besides this, the projected population for the year of 2020-2021 is also calculated with the help of the following equations (Mandal, 1982).

$$F = P_1 + (r_i \times Y) \dots \dots \dots (ii)$$

$$r_i = (P_2 - P_1) / Y \dots \dots \dots (iii)$$

Where, F = Projected population, P_1 = Population of the first year, r_i = Rate of increase, P_2 = Population of the last year and Y = Time interval between the first and the last year.

And lastly projected required productions have been calculated with the help of per capita consumption of fruits and vegetables per day as follows (National Horticulture Mission- Action Plan for West Bengal, 2005)

$$\text{Vegetables} = 175 \text{ gm/day and Fruits} = 45 \text{ gm/day.}$$

SCENARIO OF WEST BENGAL IN HORTICULTURE

West Bengal's six agro-climatic zones offer variety of environs for the cultivation of different horticultural crops round of the year (Table-5). The state is a leading producer of a wide variety of horticultural crops. It produces significant quantities of traditional vegetables like brinjal, tomato, cabbage, cauliflower, cucurbits, and lady's finger. It also produces non-traditional vegetables like broccoli, gherkins, baby corn, brussels sprouts etc. Among fruits, the major ones are pineapple, litchi, guava, banana, mango and sapota. The state is the largest producer of pineapple and second largest producer of litchi (Economic Review, 2011-2012). The state also grows significant amount of coconut, cashew nut, betel vine. Besides, the state grows a variety of high value and exotic flowers like *Rose*, *Jasmine*, *Arabian jasmine (Bel, Mallika)*, *Italian or Royal jasmine (Chameli)*, *Holihoc*, *Lotus*, *Garbera*, *Begonia*, *Gloriosa*, *Freesia*, *Calandium* etc. Historically Darjeeling hills have a pioneering role in the development of floriculture in India. The state has immense possibilities in medicinal plant cultivation, which are in great demand in both domestic and international markets.

PRESENT STATUS AND SUSTAINABILITY OF HORTICULTURE IN WEST BENGAL

An area of 2,11,640 hectares was brought under the cultivation of fruit crops during 2010-2011 which indicates 22.55% increase in area over 2005-2006. Production of fruit crops has increased by 28.21% during the same time interval. Among fruit crops, mango ranks the first position in respect of total area under the cultivation of fruit crops (89.54 thousand hectares). The areas under the cultivation of mango and its production have increased by 27.15% and 20.81% respectively. The key growing districts of mango are Malda, Murshidabad, North 24 Parganas, Hooghly, Burdwan and Purba Medinipur.

The important varieties of mango are *Langra*, *Fazli*, *Laxman-Bhog*, *Gopal-Bhog*, *Himsagar*, *Amrapali*, *Aswina* etc. The potential return is about Rs 40,000 to 50,000 per hectare. Banana bears the second position according to area under cultivation (27.8 thousand hectares) and the production (1010.15 thousand tonnes). The highest increase in area (37.38%) and production (85.39%) has been noticed in case of banana. The major growing districts of banana are Jalpaiguri, Nadia, Murshidabad and North 24 Parganas. The key varieties of banana are *Kanthali*, *Chatim*, *Chapa*, *Giant-Governer*, *Robusta*, *Martaman*.

The potential return is about Rs 45,000 to 50,000 per hectare. Guava is an another important fruit which is mainly cultivated in Jalpaiguri, Paschim Medinipur, North 24 Parganas, Bankura and Purulia. The key varieties of guava are *Allahabad-Safed*, *Banarasi*, *Chittidar*, *Harija*, *Baruipur*, *KG* etc. Areas under cultivation and production of guava have increased by 37.35% and 16.90%.

The potential return is about Rs 35,000 per hectare. Orange is an important horticultural crop in West Bengal which covers an area of about 3.76 thousand hectares. The area under cultivation of orange and its production has increased by 5.92% and 13.81%. The growing districts of orange are Darjeeling and Jalpaiguri. The potential return of orange is about Rs 40,000 to 50,000 per hectare. When one considers the area under

cultivation and production of pineapple, it is seen that both the area and production of pineapple have been decreased by 27.75% and 19.91%.

Table-1: Agro-climatic zones in West Bengal

Zone	Region	Sub-Region	Districts covered	Characteristics	Major Horticultural Crops
Zone-II	Eastern Himalayan Region	Hills	Darjeeling	Mainly brown forest soil, acidic in nature(pH 3.5-5.0), rainfall -2500-3500 mm	Pineapple, Mandarin-Orange, Tomato
		Terai	Jalpaiguri, Cooch Behar	Soils are mostly sandy to sandy loams, porous, low in base content, acidic in nature (pH 4.2-6.2), rainfall- 2000-3200 mm	Pineapple, Jackfruit, Orange, Banana, Guava, Tomato, Cashew, Turmeric
Zone-III	Gangetic Region	Old alluvium	North and South Dinajpur, Malda	Soils are mildly acidic to neutral (pH 5.2-7.0),rainfall- 1500-2000mm	Mango, Pineapple, Litchi, Tomato, Cabbage, Cauliflower
		New alluvium	Murshidabad, Nadia, Hooghly, Burdwan, North 24 Parganas	Soils are deep, mostly neutral in reaction (pH 5.5-7.0) and fertile, rainfall- 1350-1450mm	Mango, Banana, Litchi, Guava, Onion, Tomato, Cabbage, Cauliflower, Cashew, Papaya, Turmeric
		Coastal saline	South 24 Parganas, Howrah, Purba Medinipur	Soils are mostly heavy clay containing with higher salts, soils pH 6.5-7.5, rainfall 1600-1800mm	Mango, Sapota, Onion, Tomato, Betelvine, Chili, Papaya, Litchi, Coconut, Cashewnut
		Red lateritic	Birbhum, Bankura, Paschim Medinipur	Soils are coarse in texture and erosion prone, pH 5.5-6.2, rainfall- 1100-1400mm	Mango, Guava, Onion, Tomato, Cashew
Zone-VII	Eastern Plateau and Hill Region		Purulia	Soils are gravelly , coarse textured, low water holding capacity, pH 5.5-6.2, rainfall- 1100- 1400 mm	Guava, Tomato

Source: References 10 and 11

On the other hand, area of about 943.32 thousand hectares was put under cultivation of vegetables in 2010-2011 which is 6.01% higher over 2005-2006. The production of vegetables has also increased by 15.38% during the same time interval. Among vegetables, the major ones are cucurbits, brinjal, cabbage, lady's finger, cauliflower and tomato. Cucurbit is cultivated in almost all the districts of West Bengal except Darjeeling. The area and production have increased by 1.62% and 20.88% respectively.

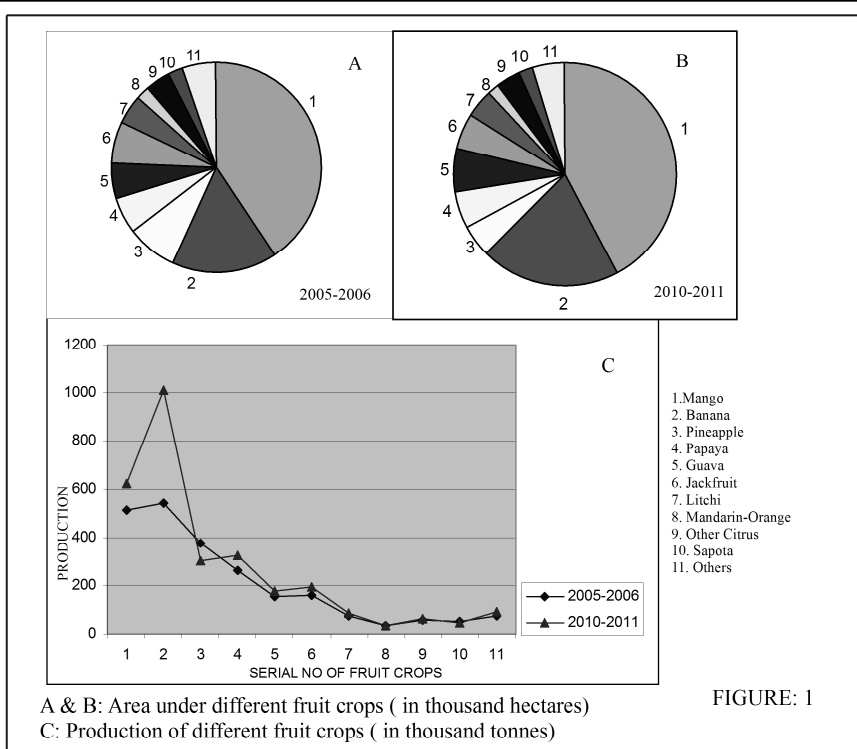
After cucurbits, brinjal holds the second position in respect of area under cultivation (158.44 thousand hectares) and the production is also high (2870.60 thousand tonnes). At present the area and production of brinjal have been increased by 3.62% and 4.10% over 2005-2006., Cabbage, lady's finger, cauliflower, these three important vegetables are cultivated in North 24 Parganas, South 24 Parganas, Nadia, Burdwan and Murshidabad. The potential return of each vegetable is about Rs 40,000 to 50,000 per hectare. It is also noticed that the highest increase in area and production are experienced in case of onion. But the area and production have decreased by 1.06% and 0.02% respectively in case of pea. (Table-2 and Figure-2).

Table-2: Area and Production of Fruits and Vegetables during 2005-2006 and 2010-2011 in West Bengal.

Name of fruits/vegetables	Area in thousand hectares		Growth rate in %	Production in thousand tonnes		Growth rate in %
	2005-2006	2010-2011		2005-2006	2010-2011	
Mango	70.09	89.54	27.75	513.34	620.17	20.81
Banana	27.8	42.03	51.19	544.87	1010.15	85.39
Pineapple	13.38	9.93	-25.78	379.87	303.66	-19.91
Papaya	9.51	11.13	17.03	263.65	324.23	22.98
Guava	9.88	13.57	37.35	152.99	178.85	16.9
Jackfruit	10.88	11.32	4.04	160.1	191.86	19.84
Litchi	8.08	8.63	7.2	74.92	85.12	13.61
Mandarin-Orange	3.55	3.76	5.92	32.51	37	13.81
Other Citrus	6.48	7.52	16.05	54.56	64.77	18.71
Sapota	4.17	4	4.08	49.02	43.58	11.09
Others fruits	8.9	10.21	14.72	76.58	93.43	22
Tomato	49.96	54.14	8.36	857.18	1063.65	24.09
Cabbage	74.71	75.28	0.76	1982.68	2087.84	5.3
Cauliflower	65.64	70.04	6.7	1666.15	1777.21	6.66
Peas	21.67	21.44	-1.06	129.38	129.36	-0.02
Brinjal	152.9	158.44	3.62	2757.44	2870.6	4.1
Onion	17.51	21.25	21.36	221.67	297.98	34.43
Cucurbits	164.72	167.39	1.62	1763.07	2131.16	20.88
Lady's Finger	65.77	74	12.51	718.94	862.12	19.92
Radish	35.73	40.29	12.76	392.27	491.76	25.36
Others vegetables	241.23	261.05	8.22	1067.97	1622.61	51.93

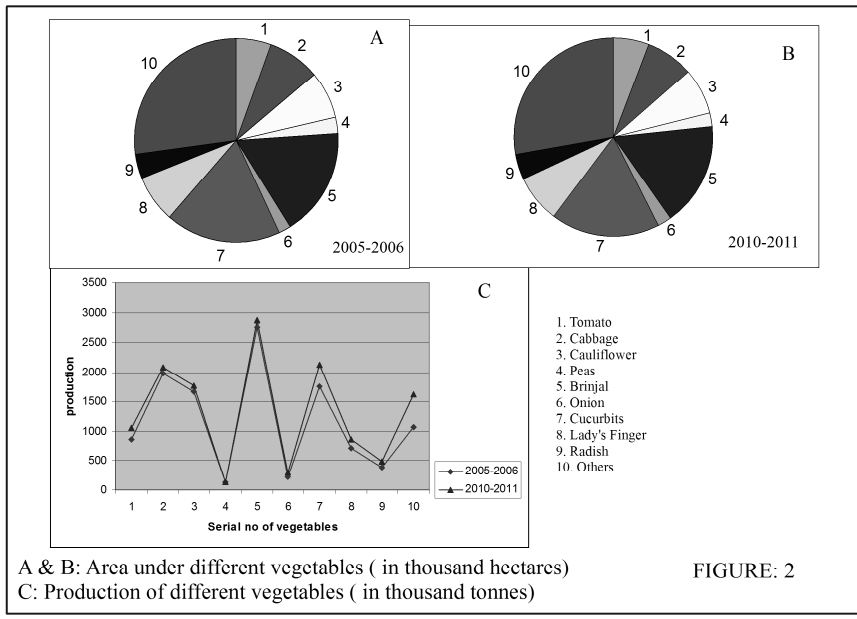
Computed by authors (Data Source: Statistical Abstract, West Bengal-2008, Economic Review-2011-2012)

The present growth rate of these horticultural crops (fruits and vegetables) is reasonably high, but the regional disparity in production of these crops is noticed across the agro-climatic regions. So a careful water management in rain-fed areas and prevention of land fragmentation are crucial for the sustenance of gains achieved. The proper soil and water conservation measures in hilly regions, adaptation with climatic change, and irrigation management should be looked into (Ghosh, 2011).



A & B: Area under different fruit crops (in thousand hectares)
 C: Production of different fruit crops (in thousand tonnes)

FIGURE: 1



A & B: Area under different vegetables (in thousand hectares)
 C: Production of different vegetables (in thousand tonnes)

FIGURE: 2

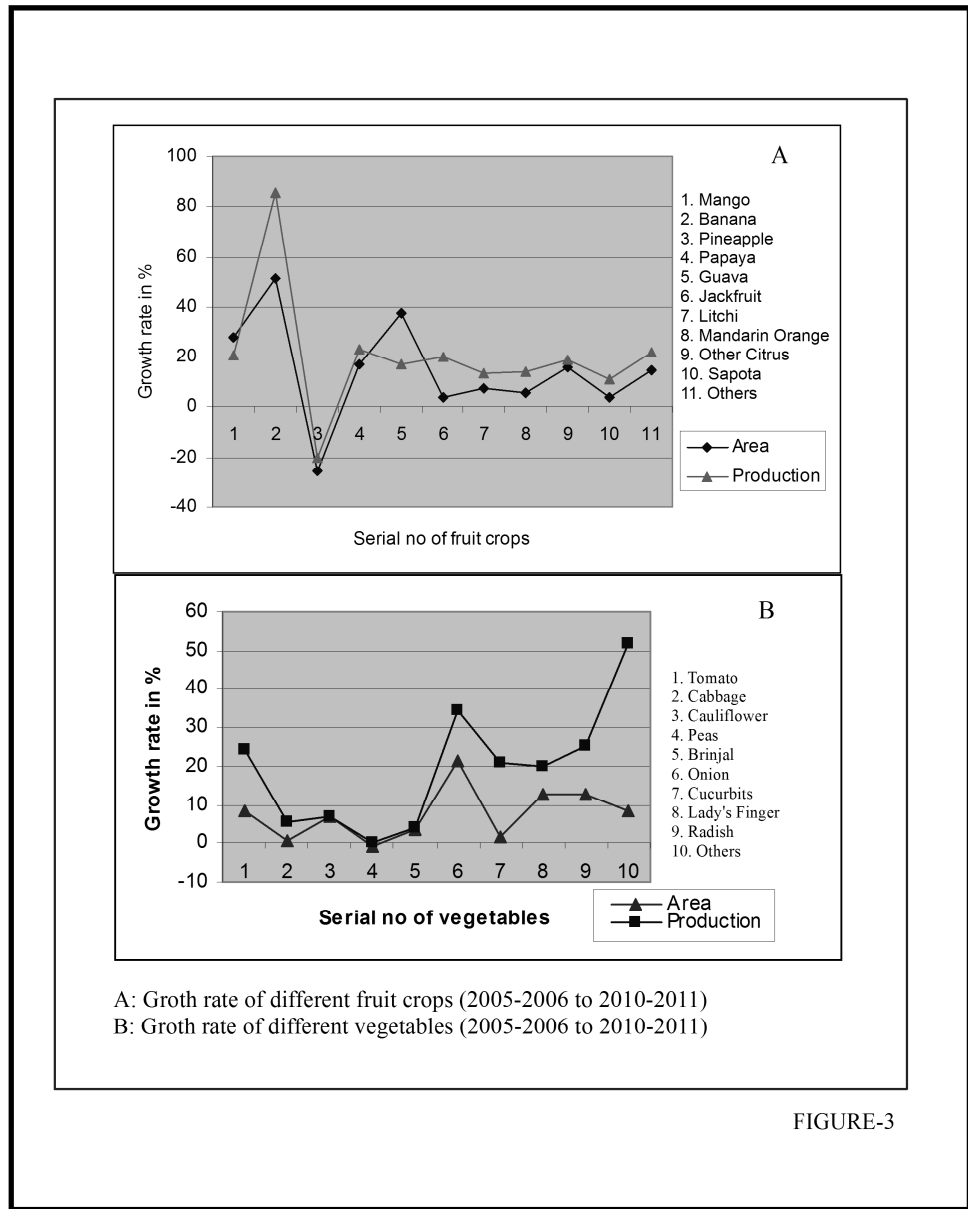


FIGURE-3

**PROJECTED PRODUCTION AND REQUIREMENT OF FRUITS AND VEGETABLES
IN 2020-2021:**

Based on the current growth rate, the projected and required productions of horticultural crops (fruits and vegetables) have been studied by the authors (Table-3 and Figure-4). It is estimated that in 2020-2021 the production of fruits and vegetables will be 5824.42 and 19061.29 thousand tonnes, where the required production of these two crops will be 1683.88 and 6548.41 thousand tonnes respectively. It is also observed that the gross production of these two crops will be higher than requirement to the extent of 4140.54 and 12512.88 thousand tonnes. But when one considers the district-wise production the following observations come out:

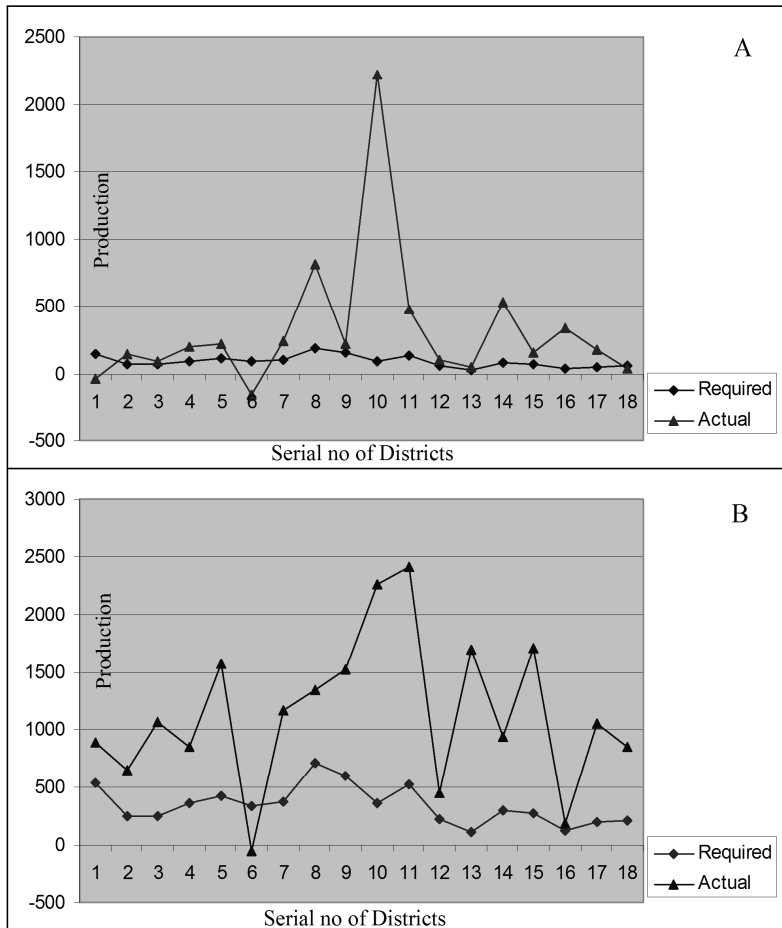
- Howrah district will be suffered by negative production of fruits (-155.40 thousand tonnes) and vegetables (-50.06 thousand tonnes).
- Burdwan district will be suffered by negative production of fruits (-38.45 thousand tonnes).
- In Purulia, the fruit production will be increased to the extent of only 3.07 thousand tonnes and the required production may decrease.
- In the district of Jalpaiguri and North Dinajpur, the fruit production will decrease to the extent of 46.32 and 22.68 thousand tonnes.
- In Darjeeling the production of vegetables will decrease to the extent of 37.79 thousand tonnes.

So the state will suffer with the regional disparities in production of fruits and vegetables, which may be the major constraint of sustainable production and commercialization of these two major horticultural crops.

Table-3: Projection of actual and required production of fruits and vegetables for the year of 2020-2021

Sl. No	Districts	Projected Population in 2021	Required production in '000 tonnes		Projected production in ;000 tonnes	
			Fruits	Vegetables	Fruits	Vegetables
1	Burdwan	8551812	140.46	546.55	-38.45	889.89
2	Birbhum	3989352	65.53	254.82	141.66	656.03
3	Bankura	3999889	65.7	255.49	95.41	1068.39
4	Purba- Medinipur	5768403	94.75	368.46	196.27	850.22
5	Paschim-Medinipur	6668201	109.53	425.93	222.22	1572.82
6	Howrah	5410177	88.86	345.58	-155.4	-50.06
7	Hooghly	5998802	98.53	383.17	240.57	1171.47
8	North 24 Parganas	11231418	184.48	717.41	810.02	1340.61
9	South 24 Parganas	9399663	154.39	600.4	219.83	1514.72
10	Nadia	5732149	94.15	366.14	2220	2261.68
11	Murshidabad	8338291	136.96	532.61	481.23	2405.92
12	Uttar Dinajpur	3559994	58.47	227.39	105.01	449.59
13	Dakshin Dinajpur	1838684	30.2	117.45	47.35	1698.9
14	Malda	4705472	77.29	300.56	532.14	940.55
15	Jalpaiguri	4338177	71.25	277.1	156.45	1711.95
16	Darjeeling	2074896	34.08	132.53	333.49	195.87
17	Cooch Behar	3166405	52.01	202.25	178.58	1059.82
18	Purulia	3319414	54.52	212.02	38.46	854.47
	West Bengal	102519275	1683.88	6548.41	5824.42	19061.29

Computed by authors



A: District wise projected production of fruit crops (Actual and Required) for the year of 2020-2021
 B: District wise projected production of vegetables (Actual and Required) for the year of 2020-2021
 (Production in thousand tonnes)

FIGURE-4

POSSIBILITIES OF HORTICULTURAL CROP CULTIVATION:

- Suitable agro-climatic conditions, topography and soil types for the cultivation of different horticultural crops (Bhattacharyya, 2008).
- More than 60% area in old and new alluvium sub regions is benefited by major and minor irrigation projects (Agricultural Statistics for Tenth Five Year Plan, 2001) thus the area offers good scope for increasing the production of various tropical and sub tropical vegetables (Table-1).
- Existence of *Agri-Export Zones (AEZ)* in various districts offer good scope for focused growth of specific horticultural crops (Table-4).
- A growing tendency to diversify from traditional agricultural crops to horticultural crops.
- There is ample scope for the expansion in area under horticultural crops.

Table-4: Export from different AEZ of West Bengal.

AEZ	Districts	Production Capacity (Tonnes)	Exports (Rs)
Pineapple	Jalpaiguri, Darjeeling, Cooch-Behar, Uttar Dinajpur.	238900	13.2 lakh
Mango	Malda, Murshidabad.	123700	40 crore
Litchi	Malda, Murshidabad, Nadia, North 24 Parganas	33730	64.5 lakh
Potato	Hooghly, Burdwan, Howrah, Purba-Medinipur	2590480	3.11 crore
Vegetables	North 24 Parganas, Nadia, South 24 Parganas, Howrah.	2706400	4.74 crore
Flowers	Purba Medinipur, Darjeeling, Jalpaiguri, Nadia	59.4 Spikes, 27.4 Loose	74.0 lakh

Source: NHM-Action Plan, 2005

CONSTRAINTS IN HORTICULTURAL CROP CULTIVATION:

- Lack of awareness on scientific farming of horticultural crops.
- Inadequate supply of quality seeds and planting materials.
- Improper infrastructure for horticultural extension, farmers' training and capacity building.
- Lack of interest, investment and innovation for rejuvenation of old orchards.
- Limited marketing information on horticultural crops and products.
- Inadequate cold storage facilities for preservation of fruits and vegetables.
- Around 88% of the total land holdings belong to marginal and small farmers and average holding is 0.82 ha (State Agricultural Plan for Agriculture, 2007). Thus, it becomes difficult to introduce the advanced technologies in farmers' fields.
- Selection of proper chemical fertilizers and pesticides.
- The soil nutrient maps prepared by National Bureau of Soil Survey and Land Use Planning (NBSS&LUP) are not of much use at ground level.
- Lowering the ground water level and environmental degradation.
- Lack of irrigation facilities.

FUTURE STRATEGIES:

- Certification programmes should be implemented to ensure the availability of quality planting materials.
- Suitability Calendar based on agro-climatic conditions for different horticultural crops (Table-5) has to be supplied among the farmers to choose the appropriate horticultural crops.
- Orange is a unique horticultural crop of hilly region and it needs research attention on priority for increasing its productivity and quality. 'Organic cultivation' be used to increase productivity and quality.
- Increase land coverage under horticultural crops through micro-irrigation practices.
- Establishment of atleast one model nursery in each district.

- Training should be given for small scale processing to Self-Help-Groups and marketing of processed products at village level.
- Augmenting the soil and water conservation of the areas through watershed programmes.
- In recent past, through the world efforts have been made to control the vegetable pest by using natural enemies, parasites, predators besides a host of specific insect viruses and success has been achieved to a compatible extent (Dubey et al, 2009). This Integrated Pest Management (IPM) strategy should be adapted in West Bengal to control diseases and pest in vegetables.

Table-5: Agro-climatic Suitability Calendar for important horticultural crops

CROP	PERIOD OF AVAILABILITY	TEMPERATURE IN °C	RAINFALL IN MM	Dose of Fertilizer application for higher yields (Kg/ ha/growing cycle)			Organic Carbon (%)	RANGE OF pH
				N	P2O5	K2O		
Mango	May-June	24-25	1000-2000	Requires fertile soil			1.2-2.0	5.5-6.0
Pineapple	April-November	20-22	1000-1200	200-300	105-150	130-265	1.2-2.0	5.0-5.4
Banana	Year Round	>22	1500-1800	50-90	60-100	150-250	1.5-2.4	5.8-6.4
Papaya	Year Round	24-25	1400-1500	200-225	100-150	120-250	1.2-2.0	6.2-6.3
Guava	July-September	20-24	1000-2000	Requires fertile soil			1.2-2.0	5.5-5.8
Jackfruit	June-August	>24	1000-2000				1.2-2.0	6.1-6.4
Litchi	May-June	24-25	1500-1800				1.2-2.0	5.5-5.9
Tomato	February-April	24-26	400-500 (gr. period)	150	200	250	1.2-2.0	7.0-7.5
Cabbage	September-March	20-24	350-400 (gr. Period)	150	115	240	0.8-1.5	6.0-6.2
Cauliflower	November-March	20-24	300-400 (gr. Period)	150	115	240	0.8-1.5	6.0-6.2)
Radish	October-February	20-22	300-400 (gr. period)	100	120	200	0.8-1.8	7.0-7.5
Pea	January-March	18-20	500-600 (gr. Period)	20-40	90-140	95-120	1.2-2.0	6.0-6.2)
Brinjal	Year Round	20-24	500-650 (gr. Period)	150	200	250	0.8-1.2	7.0-7.2
Onion	March-April	20-22	500-600 (gr. Period)	60-100	55-105	55-95	1.2-2.0	5.2-6.0
Lady's Finger	April-November	20-22	600-700 (gr. period)	100-150	200-220	230-250	1.2-1.8	5.4-6.2

Source: Sys. Ir. C (1993) and Reference-10

CONCLUDING REMARKS:

Considering that the state of West Bengal enjoys available conditions for horticultural crop cultivation, there is a need to create awareness and make the farmers receptive to the new technology through farmers' participating demonstration and training. Training facilities with respect to growing of horticultural crops and raising nursery has to be made available as per requirements. Therefore, there is a need for establishing a proper marketing system so that the vast potential of horticulture crops can be explored as commercial scale cultivation through adoption of improved production technology.

REFERENCES:

1. Agricultural Statistics for Tenth Five Year Plan (2001), Planning Commission, Government of India, New Delhi.
2. Bhattacharyya, R. (2008); Crop diversification: A search for an alternative income of the farmers in the state of West Bengal, International Conference on Applied Economics (ICOAE), pp-83-94.
3. Dubey, A. K., Babu, K. D and Yadav, D. S (2009); Status and prospect of horticulture in NEH region, ENVIS Bulletin, Vol-10(2), Himalayan Ecology.
4. Economic Review (2011-2012), Statistical Appendix, published by Bureau of Applied Economics and Statistics, Department of Statistics and Programme Implementation, Government of West Bengal.
5. Ghosh, P. (2011); Carrying capacity of Indian horticulture, Current Science, Vol-102, No-6, pp-889-893.

6. Kothari, C. R (2011); Research Methodology- Methods and Techniques (Second Revised Edition), New Age International (P) Limited Publishers, New Delhi.
7. Mandal, R. B. (1982); Statistics for Geographers and Social scientists, Concept Publishing Company, New Delhi.
8. National Horticulture Mission- Action Plan for West Bengal (2005), Prepared by Rabo India Finance Pvt. Ltd for Ministry of Agriculture, Government of India.
9. State Agricultural Plan for Agriculture (2007), Prepared by Social Organization for Integrated Living (SOIL), Submitted to NABARD.