

Spatio-temporal dynamics of vegetable crop production in India

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Abstract

Horticulture is a profitable and diversified option for the development of rural economy. Being endowed with its wide variable climate and soil, India has immense potentialities for the development of horticulture especially vegetable crops production. In the year 2009-10, India is the second largest producer of vegetables in the world (next to China). The present paper highlights the spatio-temporal variations in vegetable production in India by using the secondary data procured from various government websites and offices. The study reveals that in spite of phenomenal growth in vegetable crop production there is lack of any effective policy measures for wiping out the problems relating to low crop productivity, limited irrigational facilities and inadequate infrastructural set up. The existing policies failed to pave the way for sustainable horticulture practice in India.

Keywords: Horticulture, Rural economy, Crop productivity, Irrigational facilities, Sustainable

INTRODUCTION

Since the base of Indian economy lies on agriculture, there is need much more attention for the sustenance of this sector. Development of allied agriculture sector especially horticulture might be a best option for diverting agricultural practice which ensures economic growth in large scale. A focussed attention was adapted to horticulture development in the post-1993 period through an enhancement of plan allocation and knowledge-based technology (Mittal, 2007). Vegetables are the best option for overcoming micronutrient deficiencies and provide smallholder farmers with much higher income and more employment opportunities per hectare than other crops (AVRDC 2006). A significant change has been experienced for area under vegetables in 2001-02 to 2009-10. Such type of areal expansion is the combined effect of diversification in production pattern of the producer and the increased demand of consumers due to shift in their consumption pattern (Mittal, 2007). But low vegetable crop productivity in India does not ensure a lucrative employment option for small holding farmers. Highly seasonal character of vegetable crop production and introduction of hybrid seeds technology has increased the cost of cultivation. Hence it is essential to choose a proper marketing channel which will be beneficial to the cultivators (Subrahmanyam et.al. 2000). The present study laid some stress on spatio-temporal variations of vegetable crop production, their problems and suggests effective policy measures for further development of this sector.

MATERIALS AND METHODS

The study is entirely based upon secondary data. Data regarding the state wise area and production of vegetables is taken from Indian Horticulture Database-2010, published by the National

Horticulture Board, Department of Agriculture & Cooperation, Government of India. The author has collected study materials from different websites and libraries. Various simple statistical techniques including Karl Pearson's Co-efficient of Correlation method is used to analyse the spatio-temporal dynamics of vegetables production in India.

RESULTS AND DISCUSSION

With its diversified soil and climatic conditions comprising several agro-ecological regions provide huge opportunity to grow a variety of tropical and sub-tropical types of vegetable in India. The major vegetables grown in India are potato, tomato, onion, brinjal, tapioca, cabbage, cauliflower, okra, peas, sweet potato etc. India being the second largest producer of vegetables contributes almost 13.38 percent to the world vegetable production and also occupies first position in the production of cauliflower, followed by second in onion and third in cabbage in the world.

Table 1. All India area and production of vegetables

Year	Vegetables	
	Area (million hectares)	Production (million metric tonnes)
1991-92	5.593	58.532
2001-02	6.156	88.622
2002-03	6.092	84.815
2003-04	6.082	88.334
2004-05	6.744	101.246
2005-06	7.213	111.399
2006-07	7.581	114.993
2007-08	7.848	128.449
2008-09	7.981	129.077
2009-10	7.985	133.738

Source- Indian Horticulture database-2010

Table-1 portrays the continuous change of area and production of vegetables over the years in India. The total area under vegetable crops was 5.593 million hectares in 1991-92 but rather it was increased to 7.985 million hectares in 2009-10. Our country has experienced a remarkable increase in vegetable production from 1991-92 i.e. 58.532 million metric tonnes to 133.738 million metric tonnes in 2009-10.

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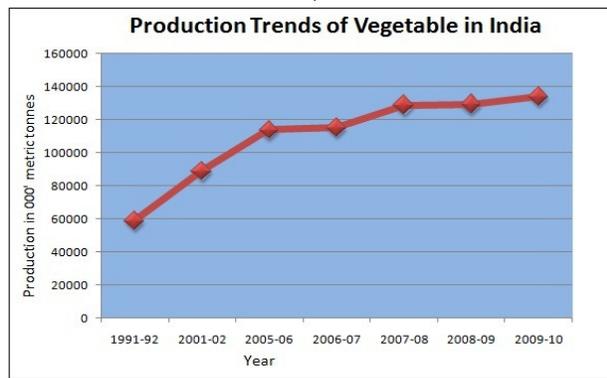


Table 2. Correlation Analysis between area and production of vegetables

Year	X	X ²	Y	Y ²	XY
1991-92	5.593	31.281649	58.532	3425.995024	327.369476
2001-02	6.156	37.896336	88.622	7853.858884	545.557032
2002-03	6.092	37.112464	84.815	7193.584225	516.69298
2003-04	6.082	36.990724	88.334	7802.895556	537.247388
2004-05	6.744	45.481536	101.246	10250.75252	682.803024
2005-06	7.213	52.027369	111.399	12409.7372	803.520987
2006-07	7.581	57.471561	114.993	13223.39005	871.761933
2007-08	7.848	61.591104	128.449	16499.1456	1008.067752
2008-09	7.981	63.696361	129.077	16660.87193	1030.163537
2009-10	7.985	63.760225	133.738	17885.85264	1067.89793
N=10	69.275	487.309329	1039.205	113206.0836	7391.082039

Source- Computed by the author

The method of Karl Pearson's Co-efficient of Correlation is

$$r = \frac{\sum XY - \frac{\sum X \times \sum Y}{N}}{\sqrt{\sum X^2 - \frac{(\sum X)^2}{N}} \times \sqrt{\sum Y^2 - \frac{(\sum Y)^2}{N}}}$$

$$= \frac{7391.082039 - \frac{7199.092638}{10}}{\sqrt{487.309329 - \frac{479.9025625}{10}} \times \sqrt{113206.0836 - \frac{107994.7032}{10}}}$$

$$= \frac{191.989401}{2.721537525 \times 72.18989126}$$

$$= 0.977206932 \text{ (positive correlation)}$$

If we take area under vegetable as a major aspect in enhancing the vegetable production throughout the years we may find a highly positive correlation between them.

State wise vegetable production in India

Due to its vast areal expenses there is a huge variation of vegetable production in different states of India. The following table (No.2) shows the changing scenario of vegetable production in different portion of the country.

Table 3. State wise vegetable production in India

STATE/UTs	Production (in 000' metric tonnes)						
	1991-92	2001-02	2005-06	2006-07	2007-08	2008-09	2009-10
ANDAMAN NICOBAR	13.2	15.8	20.0	32.576	30.823	30.823	41.5
ANDHRA PRADESH	1452.6	2586.7	4374.1	4355.8	4946.3	5267.5	5426.2
ARUNACHAL PRADESH	79.9	83.9	81.1	110.0	126.3	110.0	38.5
ASSAM	2132.3	2935.2	4229.3	4449.5	4474.2	2916.7	4569.9
BIHAR	8643.1	8022.9	13356.7	13612.9	14067.8	13385.7	13906.8
CHANDIGARH	11.1	1.7	1.7	1.700	1.700	1.700	1.7
CHHATISHGARH	NA	1355.3	2432.3	2801.9	2934.2	3041.0	3601.1
D & N HAVELI	13.6	13.5	13.5	13.500	4.480	4.480	4.5
DAMAN & DIU	0.3	1.1	0.2	0.200	0.200	0.2	0.2
DELHI	627.8	747.4	672.0	672.0	595.6	617.4	617.4
GOA	NA	76	165.2	84.290	85.0	57.6	57.8
GUJARAT	1667.9	3278.2	6308.3	6062.5	7403.0	6807.1	7255.5
HARYANA	877	2151.9	2984.7	3366.9	3277.1	3893.4	3987.0
HIMACHAL PRADESH	476	639.1	1062.2	1150.7	1150.7	1263.9	1390.7
JAMMU & KASHMIR	745	728.9	1052.9	1247.7	1238.3	1023.6	1374.2
JHARKHAND	NA	1736.3	3401.3	3394.9	3639.7	3637.0	3469.2
KARNATAKA	3673.2	4173.2	6704.3	5478.5	7367.1	7724.9	7082.2
KERALA	3229.1	2541.9	3286.1	3234.2	3479.0	3509.4	3518.1
LAKSHDWEEP	0.4	0.2	0.3	13.966	14.120	14.120	14.1
MADHYA PRADESH	2221	1817.5	2796.0	2814.0	2919.7	4105.8	3112.6
MAHARASHTRA	4171.3	5128.3	4739.7	6148.0	6454.9	6368.0	6172.6

MANIPUR	50.3	66.1	67.3	91.767	113.675	174.3	221.8
MEGHALAYA	219.2	265.9	340.2	345.4	352.5	415.8	415.8
MIZORAM	31.8	44.1	31.4	31.254	51.860	114.374	179.1
NAGALAND	66.9	286	51.2	44.593	63.500	78.330	78.3
ORRISA	7275	7447.4	8052.7	8180.3	8214.8	8467.4	8963.6
PONDICHERRY	22.3	54.2	54.7	54.701	54.701	81.010	81.0
PUNJAB	1450	2275.6	2434.9	2518.2	2772.1	3410.3	3522.5
RAJASTHAN	307	432.5	740.8	788.3	853.3	736.7	1071.9
SIKKIM	46.1	60	79.1	80.810	95.872	98.039	147.7
TAMIL NADU	3796.9	5444.6	6546.7	7070.4	7975.7	8693.5	7627.7
TRIPURA	306.8	353.2	365.1	415.9	423.6	294.7	446.9
UTTAR PRADESH	9627.3	15044.8	17130.0	18190.4	19790.3	18950.1	22435.7
UTTRANCHAL	617.6	737.3	911.7	995.5	1036.2	1077.6	997.3
WEST BENGAL	4680	18075.3	19019.2	17140.0	22456.8	22704.3	21906.5
TOTAL	58532	88622	113507.0	114993.3	128465.1	129076.8	133737.6

Source- Indian Horticulture database-2010

Uttar Pradesh, West Bengal, Bihar and Orissa together produce almost 50.3% (2009-10) of the total production in India. Extensive alluvial flood plain, adoption of high yielding cultivars, disease and pest resistant varieties and suitable production technologies lead to higher production in those states. Due to inadequate irrigation system, unfavourable geo-physical conditions and less emphasis on vegetable crops, the states (except Assam) belonging to 'Land of Seven Sisters' i.e. Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura produces only 1.03% of the total production in 2009-10. Besides the states of south India viz. Tamil Nadu, Karnataka, Andhra Pradesh and Kerala also produces several vegetables to a moderate quantity (17.75% of total production in 2009-10). A tremendous progress has been made towards the self

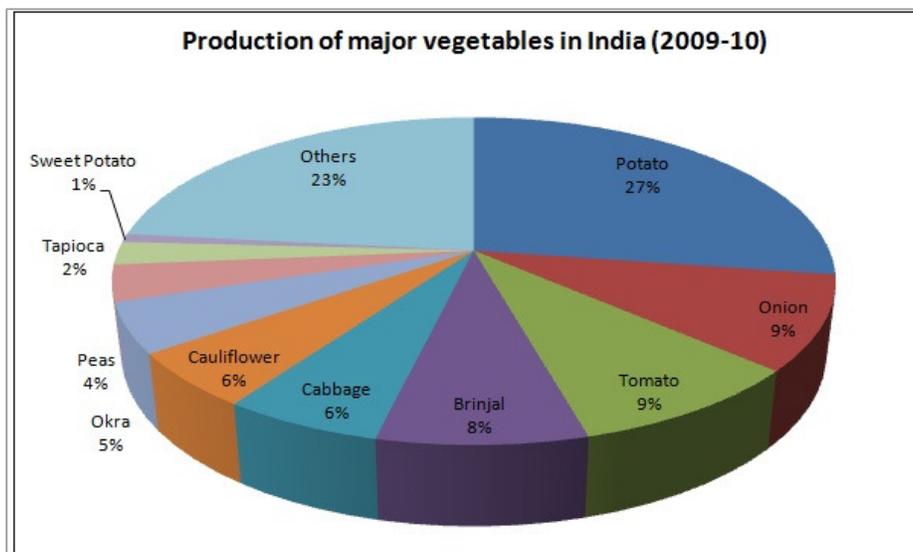
sufficiency in agriculture through an immense growth of vegetable production from 58.532 million metric tonnes in 1991-92 to 133.74 million metric tonnes in 2009-10. After considering 1991-92 as the base year for analysis it reveals that West Bengal, Gujarat, Andhra Pradesh and Haryana could almost double their production till 2009-10. Such type area driven production growth not only indicates the successes of horticultural programme but also an indicative of growing interest among the farmers for enhance their income level in the lines of vegetables production which ensures highest crop diversification

Major Vegetable crops grown in India

Table 4. Production trends of major vegetables in India

Year	Production in 000' metric tonnes									
	Potato	Onion	Tomato	Brinjal	Cabbage	Cauliflower	Okra	Peas	Tapioca	Sweet Potato
2001-02	24456.1	5252.1	7462.3	8347.7	5678.2	4890.5	3324.7	2038.2	6515.9	1130.3
2002-03	23161.4	4209.5	7616.7	8001.2	5392	4444.1	3244.5	2061.8	5426.2	1130.3
2003-04	27925.8	6267.6	8125.6	8477.3	5594.6	4940.2	3631.4	1901.2	5949.6	1179.1
2004-05	28787.7	7760.6	8825.4	8600.8	6113.5	4514.8	3512.4	1944.8	7462.8	1179.4
2005-06	29174.6	9432.5	9820.4	9364.6	5637.3	5323.1	3974.6	2270	7854.9	1066.5
2006-07	28600	10847	10055	9453	5584	5538	4070	2402	8232	1067.2
2007-08	34658	13900	10303	9678	5910	5777	4179	2491	9056	1094
2008-09	34391	13565	11149	10378	6870	6532	4528	2916	9623	1120
2009-10	36577.3	12158.8	12433.2	10563	7281.4	6569	4803.3	3029.4	8059	1094.7

Source- Indian Horticulture database-2010



Major findings of the study

1. There is a slight increase of area under vegetable from 1991-92 to 2009-10 (5.593 to 7.985 million hectares).
2. A highly positive correlation (+0.977206932) exists between area and production of vegetables in India.
3. Due to extensive fertile alluvial flood plain covered by Ganga and its major tributaries Uttar Pradesh stands highest in vegetable production in India. It produced 22.44 million metric tonnes vegetables in 2009-10.
4. Lack of agricultural land and emphasis on industrial activity is a major constraint in production of vegetables in union territories like Daman & Diu, Dadra & Nagar Haveli, Delhi, Lakshdweep, Pondicherry.
5. Potato accounts almost 27% of total vegetable production in India (2009-10).
6. Decrease of demand in national and international market reduces the production of sweet potato from 1.13 million metric tonnes in 2001-02 to 1.10 million metric tonnes in 2009-10.
7. Since production of vegetable crops is largely dependent on seasonality, there is a fluctuating trend of production seen throughout the years for major vegetable crops.

SUGGESTIONS

1. To ensure all round availability of vegetables it is necessary to use climatic variability, hi-tech production systems and greenhouses.
2. Establishment of more cold store for the preservation of vegetables.
3. Integrated pests and disease management program should be encouraged for maintaining the requisite quality of exports.
4. Development of agribusiness marketing and agricultural policy for the vegetable sector.
5. Awareness should be increased to use the biofertilizer instead of chemical fertilizer.

CONCLUSION

To render agricultural development in present day context it is necessary to promote crop diversification which can only be achieved through varieties of vegetable production. It also ensures all the year round employment guarantee as there is a huge variety of vegetable crops grown in different seasons. Hence sustainable development of horticulture specially vegetables production could support the rural small land holders to a great extent.

So far, various projects have been taken out by National Horticulture Mission for an integrated development of horticulture throughout the country. But spatio-temporal analysis of vegetable production reveals that there is a huge gap between actual and potential production. Intensified effort should be taken up for the use of modern technology and hybrid seeds for better production of vegetables.

REFERENCES

- [1] AVRDC. 2006. Vegetables Matter, AVRDC- The World vegetable center. Shanhua, Taiwan.
- [2] Indian Horticulture Database. 2010. National Horticulture Board, Department of Agriculture & cooperation, Government of India.
- [3] Mittal S. 2007. Can horticulture be a success story for India? Working paper no. 197. New Delhi: Indian Council for research on International Economic Relations (ICRIER).
- [4] Subrahmanyah, K.V. and Gajanana, T.M. 2000. 'Co-operative Marketing of Fruits and Vegetables in India', Concept publishing company, New Delhi, pp. 37-38.
- [5] Report of the Working Group on Horticulture Development for The Tenth Five year Plan. 2001. Planning Commission, Government of India.