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# SPATIAL PATTERN AND PROCESSES OF HORTICULTURAL DEVELOPMENT IN HARYANA DURING POST LIBERALIZATION PERIOD

## Doctoral Dissertation Abstract

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The economic significance of horticulture has increased during the recent period as it has become a remunerative enterprise for farmers in India. It has emerged as a crucial sub-sector of agriculture for the inclusive growth. There are various factors that have contributed to the development of horticulture in the state of Haryana during the last three decades. Firstly, more than two-fifth of the state falls within the geographical coverage of the National Capital Region (NCR). The markets of the national capital and towns of NCR have provided tremendous scope for commercial cultivation of vegetables, fruits, medicinal plants and other horticultural products. Secondly, fruits and vegetables processing units in the region require raw materials. Thirdly, the economic restructuring initiated in the early 1990s has provided impetus to horticultural growth. The changing food basket of the middle class and the opportunity for exporting tradable horticultural products have also helped its expansion during last three decades. The institutional support to horticultural farmers has been provided by the initiation of the National Horticultural Mission in 2005-06. The present study evaluates the growth and expansion of horticultural cultivation in Haryana in the background of globalization of the Indian economy, middle-class affluence-induced changes in the food basket

and the opening of the world agricultural markets. The present study also explores the elements of horticultural development in terms of their changing spatial pattern, distribution, concentration, diversification and economic organization with respect to the agro-climatic regions of the state.

### Objectives of the Study

Major objectives of the study are:

- to study the dynamics and spatial pattern of horticultural development in the state during post-liberalization period;
- to examine the spatial pattern of cultivation and production of major horticultural crops in the state;
- to carry out cost-benefit analysis of the production of major vegetables and fruits with respect to agro-climatic regions and evaluate determinants of their yield and
- to assess the problems and prospects of vegetables and fruits cultivation in the state.

### Database and Methodology

The study is based on both primary and secondary data. The secondary data have been obtained from the Directorate of Horticulture, Government of Haryana. It has been carried out

in the background of changes induced in horticultural sector during the post-economic reform period and with reference to three points of time, 1990-91, 2002-03, and 2016-17. The primary data have been collected through field survey covering 450 horticultural farmers, 225 each from vegetable and fruit growing farmers. The data at the household level have been collected by employing multi-stage sampling. Two districts having the highest proportion of area under vegetables and fruits have been selected from Haryana agro-climatic regions like North-eastern (Yamuna Nagar and Ambala), Eastern (Karnal and Sonipat), Southern (Gurugram and Nuh) and Western (Hisar, Fahtehabad/Sirsa) region. From the Western region, Fahethabad district has been taken only for vegetables, while Sirsa district has been chosen only for fruits cultivation sampling. From these districts, two or three villages having high acreage of vegetables and fruits have been purposively selected for field survey. About 25 to 30 vegetable or fruit growing farmers have been randomly selected to collect the data and information through a semi-structured questionnaire/schedule.

### **Major Findings of the Study**

The post-economic liberalization period has witnessed about seven-fold increase in area under horticultural crops in the state, which expanded at an annual compound growth rate of 7.56 per cent. The initiation of the National Horticultural Mission in 2005-06 provided momentum and the area kept on growing at an annual compound growth rate of 6.6 per cent. Consequently, the area under horticultural crops increased from 1 per cent in 1990-91 to 7.6 per cent in 2016-17. Horticulture in the state is dominated by

cultivation of vegetables accounting for 83.86 per cent of the total area under all horticultural crops. Fruits occupied only 12.56 per cent of area under horticultural crops in the state during 2016-17. Initially, horticultural crops have been confined to the north-eastern region and their cultivation subsequently spread to eastern parts. Seven districts namely Sonipat, Yamuna Nagar, Karnal, Panipat, Ambala, Nuh and Gurugram forming a belt in the eastern part of the state accounted for about three-fifth of total horticultural area of the state in 2016-17. The highly diversified pattern of horticultural crops shows that the state does not specialize in few commodities of horticulture. Sirsa and Kurukshetra are the only two districts specializing in citrus fruits and potato cultivation, respectively. However, over the period 1990-91 to 2016-17, there has been a tendency for diversification in these districts too. Monoculture and two crop combinations of horticultural crops have totally disappeared during this period.

The vegetable area has recorded the highest rise in the state from 1990-91 to 2016-17, at an annual compound growth rate of over 8 per cent. In the first phase between 1990-91 and 2002-03, the vegetable area expanded mostly in the eastern parts and also stretched to central and western parts of the state. The second phase (2002-03 to 2016-17) witnessed intensification of vegetable cultivation in the eastern region and its expansion continued in western and southern areas. Overall, vegetable cultivation in the state still continues to be concentrated in eastern parts, largely associated with higher levels of irrigation development and proximity to the markets of NCR urban centres and Chandigarh tri-city. There hardly seems a regional specialization of vegetables, although the intensity of vegeta-

bles cultivation is comparatively high in eastern parts and quite low in extreme south and south-western parts of the state.

Fruits constitute the second largest group of horticultural crops after vegetables in the state. The total area under fruit crops increased at an annual compound growth rate of 6.5 per cent from 1990-91 to 2016-17. Fruits cultivation has been largely concentrated in north-eastern Haryana along the Shivalik foothills till 2002-03. But afterwards it intensified in the north-eastern region and expanded to the eastern, north-western and south-eastern parts of the state. Like vegetables, fruits cultivation is also quite diversified in the state. The cultivation of new fruits has come up in recent period i.e., guava in eastern and western regions and citrus fruits in western parts. Mango continues to be the main fruit in the north-eastern parts; whereas watermelon has emerged as an important crop in the NCR, mainly in Sonapat and Gurugram districts. The citrus fruit (mainly kinnow) region extends from Sirsa to Mahendergarh in western Haryana. The north-eastern region along the Shivalik belt mainly grows mango and guava. The central districts, Jind and Rohtak, form the guava-citrus fruit belt. Watermelon, muskmelon and guava combination dominates in Sonapat, Gurugram and Nuh districts. There are two pockets of guava-citrus and fruit-ber cultivation; Jhajjar and Rewari in south-central Haryana and Faridabad and Palwal in south-eastern region respectively.

The primary data-based analysis reveals that vegetable farming in Haryana has been carried out mostly by medium and small farmers. The state exhibits considerable spatial variations in the cultivation of vegetables. In terms of agro-climatic region-wise distribution, potato is the dominant vegetable crop in

north-eastern Haryana followed by tomato and cauliflower. The vegetables cultivation pattern is quite diversified in eastern Haryana. Tomato, pea, bitter gourd, cucumber, bottle gourd and radish are main vegetables grown in this region. The vegetables cultivation is quite diversified in southern Haryana too. Western Haryana also exhibits a diversified vegetables cropping pattern. Cauliflower is the dominant vegetable crop grown in this region. Apart from this, long melon, carrot, summer squash and onion crops are also important.

The output-input analysis shows that the cultivation of all vegetables under study is economically viable in the state. Tomato is among the highest yielding vegetable crops in the State (529 quintal/ha) and its highest yield has been recorded in eastern Haryana. The output-input ratio (1.97) of tomato is highest in eastern Haryana which may be attributed to vertical farming and good irrigation facilities. Cauliflower comes out to be the most profitable vegetable crop in north-eastern Haryana. The potato is a relatively low-cost and low-return crop. Further, the output-input ratio of onion is 2.22 and southern Haryana is most suitable for its cultivation as it is way ahead of the other regions both in terms of net returns per/ha and output-input ratio. Radish also gives a bulky yield in the state (503 quintal/ha). The gross return, net return and output-input ratio of radish are far ahead in eastern Haryana as compared to other regions. The output-input ratio of bitter gourd is 1.52 and it counts among the low profit vegetable crops in Haryana. The carrot cultivation has high returns, as its output-input ratio is 1.99. However, the pea cultivation is also a low-returns economic pursuit, as its output-input ratio is 1.39. Among all the vegetables grown in Haryana, there is a high net return per/ha for brinjal and onion but

it is low in the case of potato and peas.

Most of the vegetables are short-duration crops and require intensive labour, particularly for planting, inter-cultural operations and harvesting/picking. On an average, vegetable cultivation provides employment of 211 man-days per ha. The hired labour constitutes the majority of the labour employed in vegetable cultivation in the state. Female labour dominates the hired labour but the family labour engaged in agriculture is overwhelmingly dominated by males. Overall, the share of females in total labour engaged in vegetable growing comes out to be 61.60 per cent which indicates the growing feminization of labour engaged in cultivation of vegetable crops in the state.

Fruit cultivation is a capital-intensive enterprise as it requires the establishment of costly orchards. The cost of establishment of orchards for the creeper fruits comes out to be even higher than that of the perennial fruits. The return per unit investment in case of kinnow cultivation is 1.88. It is the more profitable economic pursuit in western Haryana than other agro-climatic regions. The cultivation cost of guava is high in eastern and western regions of the state. However, its cultivation is most profitable in the state as its output-input ratio is 3.12. There is also a good economic return from mango as its output-input ratio is 2.47.

Watermelon cultivation has the highest yield and gross return in eastern region where it is mostly cultivated in the fertile land of Yamuna *khadar*. The output-input ratio of muskmelon is 1.96 and has a very high net return/ha and cost-benefit ratio in eastern Haryana. Strawberry cultivation is an extremely high cost and labour-intensive economic pursuit. Its input cost comes out to be

₹854311 per ha with a high net return of ₹1091977 per ha. The output-input ratio of this fruit is quite high in western Haryana (2.28) compared to other regions.

Like vegetables, fruit cultivation is also a labour-intensive economic pursuit. On an average, it provides employment of 281 man-days per ha. Among different fruits, strawberry gives the highest employment, 831 man-days per/ha and it is lowest for mango cultivation, 109 man-days/ha. Overall, the labour requirement is higher for cultivation of creeper fruits. Further, females dominate the hired labour employment and constitute about 69 per cent of the hired labour in growing of fruits. Males dominate the family labour in fruit cultivation except strawberry. Overall, females constitute about 60 per cent of the total workers employed in fruit cultivation.

Analysis of farmers' perception reveals that high income, off-season employment, inspiration from neighbours, nearness to market and short gestation period are the main factors for taking up vegetable farming in Haryana. High prices of input materials i.e., cost of pesticides, chemicals, fertilizers and seeds are the main hurdles for vegetable growers. Price volatility and perishability are the other issues concerning farmers. Besides, scarcity of good quality of water (surface and ground) is considered as the major cause of low productivity of vegetables in western and southern Haryana.

The main constraint in the adoption of fruit cultivation is long waiting period. The higher cost of input material, spoilage and gluts adversely affect the prices and the net returns from fruit cultivation. Non-availability of labour is another main constraint in the cultivation of fruits. The volatility of fruit prices is also perceived to be a constraint in

fruit cultivation by majority of farmers. Farmers demand minimum support prices for fruits like field crops. Other constraints faced

by the fruit growers are a lack of waxing plant, loan availability at a reasonable rate of interest, and technical support from extension staff.

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