



Agricultural productivity in Punjab and Haryana region: An investigation

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Abstract

The level of agricultural productivity or performance, as a concept, means the degree to which, the economic, cultural, technical and organizational variables (i.e. the man-made frame) are able to exploit the abiotic resources of the area for agricultural production. The intensity and quality of inputs in the field have a direct bearing on the output in the form of production and yield. Agricultural productivity is an important indicator of agricultural development having a reciprocal relationship with agricultural development. The increase in agricultural productivity is, both, the cause and effect of agricultural development. This paper analyzes the trends and spatial patterns of agricultural productivity in Punjab and Haryana region during 1971-2011 and makes a comparison between the two states to find out their level of development in terms of agricultural productivity in the study region. Among the various techniques available for measuring agricultural productivity, Mohd. Shafi's technique (1972) has been selected in this study and three years average value (for all the mentioned years) of agricultural productivity has been calculated to determine its level in the region.

Keywords: agricultural productivity, spatial pattern, state-level comparison, trends, Punjab and Haryana region

Introduction

The level of agricultural productivity or performance, as a concept, means the degree to which, the economic, cultural, technical and organizational variables (i.e. the man-made frame) are able to exploit the abiotic resources of the area for agricultural production (Singh and Dhillon, 2000) [5]. The intensity and quality of inputs in the field have a direct bearing on the output in the form of production and yield. During the mid-sixties, the introduction of new techniques along with the institutional and infrastructural changes ushered the green revolution in the country. The agriculture was modernized with widespread use of new equipment, high yielding seeds and new farm technology. The equipment and technology ranged from using tractors instead of cattle to till the soil to the use of new fertilizers and high yielding varieties seeds (Chatterjee, 2012) [1]. The immediate result of green revolution was the increase in agricultural productivity in the areas selected under the Intensive Agricultural District Programme (IADP) which mainly included the districts of Punjab and Haryana plains along with parts of western Uttar Pradesh. The increased agricultural productivity has enabled India not only to become self-reliant in food-grains but also export the surplus production, thereby, contributing to the Gross National Product (GNP) of the country.

Thus, agricultural productivity is an important indicator of agricultural development having a reciprocal relationship with agricultural development. The increase in agricultural productivity is, both, the cause and effect of agricultural development.

Objectives

1. To analyse the growth of agricultural productivity in Punjab and Haryana region during 1971-2011.

2. To understand the spatial pattern of agricultural productivity at the district level in the region in 2010-11.
3. To make a comparison between the two states to find out the overall performance with respect to agricultural productivity in the study region.

Methodology

The present study is totally based on secondary data taken from various issues (1971-2012) of Statistical Abstracts of Punjab and Haryana. In order to measure the agricultural productivity, Mohd. Shafi's technique (1972) has been selected and the following formula has been applied to obtain the desired result:

$$\text{Productivity Index} = \frac{\sum yn}{tn} : \frac{\sum Yn}{Tn}$$

Where yn = total production of the selected crops in the unit area,

TN = total cropped area under those crops in the unit area,

YN = total production of the selected crops at regional level,

TN = total cropped area under those crops at regional level, and n = the selected crops.

Although, varieties of crops are grown in the study area, yet a few crops occupy much of the agricultural land and contribute a large share in the total production. In this study, crops of wheat, rice, sugarcane, potato and cotton have been selected for finding the agricultural productivity in the region. Wheat and rice are the principal crops grown in all the districts whereas the other crops are cultivated in the selective belts. In this study, three years average value (for all the mentioned years) of agricultural productivity has been calculated to

determine its level in the region.

Study Area

The present study deals with the Punjab and Haryana region. The states of Punjab and Haryana are neighbours situated in the north-western part of India in the Indo-Gangetic plains. The study region covers a total area of 94,574 sq. kms., extending from 27°37' North to 32°32' North latitudes and from 73°55' East to 77°36' East longitudes. It is surrounded by Jammu and Kashmir in the north, Himachal Pradesh in the north-east, Uttar Pradesh in the east, Rajasthan in the south and west and Pakistan in the north-west. The study area (in 2011) is divided into 41 districts, out of which 21 districts are of Haryana and 20 districts are from Punjab.

Discussion

The Punjab and Haryana region is the birth-place of green revolution. This region has greatly benefitted from the new technology and equipments introduced in order to transform the agriculture from backward and subsistence to modern and commercial and this is clearly evident from the sharp increase in the agricultural productivity of the region.

Punjab has recorded spectacular rates of growth in agricultural output and productivity under the impact of technological advancement in recent years. This state has earned the title of "Granary of India" as it has made substantial contribution to the national pool of food reserves. Such a glorious

achievement can be mainly attributed to the evolution and statewide adoption of the new agricultural strategy comprising high-yielding varieties of seeds, chemical fertilizers, insecticides/pesticides, etc. on areas provided with assured irrigation (Sain, 1987) [3].

A remarkable increase in foodgrains production is visible in Haryana since 1970-71. Apparently, the increase in production was due almost entirely to increase in yield. Wheat and rice played a major role in pushing up the agriculture production. As a result of higher production of food grains, the state of Haryana is one of the largest contributors of food grains to the central pool. The contribution of Haryana in the procurement of wheat to the total procurement made in the country is next only to Punjab. Similarly, Haryana has also been significantly contributing to the procurement of rice in the country (Planning Commission, 2009) [2].

Trends in Agricultural Productivity

The infrastructure building which started as a part of new agricultural technology has strengthened the agrarian base of the region to such an extent that this region has recorded a phenomenal increase in the production of crops, especially wheat and rice, ever-since. For determining the agricultural productivity of the region, the area and production of selected crops (wheat, rice, sugarcane, potato and cotton) has been taken into account to derive the productivity index for the period 1971-2011 and presented in Table 1.

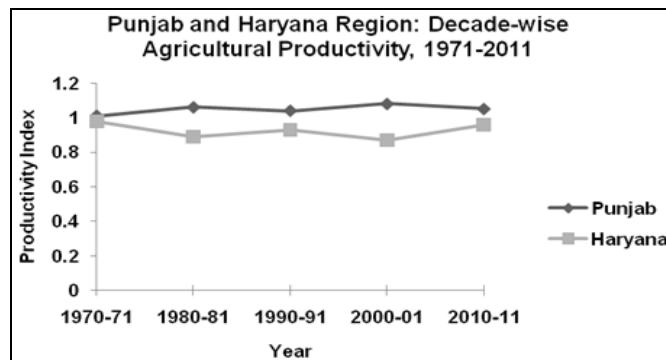
Table 1: Punjab and Haryana Region: Decade-wise Agricultural Productivity, 1971-2011

Year	Productivity Index	
	Punjab	Haryana
1970-71	1.01	0.98
1980-81	1.06	0.89
1990-91	1.04	0.93
2000-01	1.08	0.87
2010-11	1.05	0.96
Growth Rate (%)	3.96	-2.08

Source: Worked out by the author.

In 1970-71, the productivity index of Punjab was 1.01 while the corresponding figure for Haryana was 0.98 indicating that Haryana was 0.3 points behind Punjab in terms of agricultural productivity (Table 1). In 1980-81, the productivity index of Punjab increased by 0.05 points whereas it decreased by 0.09 points in Haryana thereby increasing the difference between the two states by 0.17 points. In the next decade, the productivity index decreased by 0.02 points in Punjab while it improved by 0.04 points in Haryana, thus, reducing the gap between the states to 0.11 points (Table 1). However, in 2000-01, Punjab witnessed an increase of 0.04 points in the productivity index whereas Haryana experienced a decline by 0.06 points and, hence, the difference in the productivity index of the two states increased to 0.21 points, which was highest so far. In 2010-11, Punjab had witnessed a fall of 0.03 points in the productivity index while, in Haryana, it had improved by 0.09 points, which had been highest so far (Fig. 1). During the period of last four decades, the productivity index of Punjab had improved by 0.04 points while, in Haryana, it had declined by 0.02 points. This is further supported by the fact that there had been a marginal improvement in the growth rate

of productivity index of Punjab (3.96 per cent) while Haryana (-2.08 per cent) had experienced negative growth rate during the same period (Table 1).



Source: Table 1.

Fig 1: Spatial Pattern of Agricultural Productivity

The agricultural productivity in the region is very high. During 2010-11, the region recorded the productivity index of

1.01 while it was 1.05 and 0.96 for Punjab and Haryana, respectively. In fact, the productivity index of Haryana was even lower than the regional average. However, wide disparities occurred at the district-level which are quite clear from Table 2.

Table 2: Punjab and Haryana Region: Agricultural Productivity, 2010-11

State/Districts	Productivity Index	State/Districts	Productivity Index
Punjab	1.05	Haryana	0.96
Moga	1.36	Yamunanagar	1.37
Sangrur	1.34	Fatehabad	1.20
Kapurthala	1.32	Rewari	1.14
Ludhiana	1.14	Faridabad	1.09
Faridkot	1.12	Jhajjar	1.06
Fatehgarh Sahib	1.11	Jind	1.06
S.A.S. Nagar	1.11	Gurgaon	1.04
Tarn Taran	1.02	Kurukshetra	1.04
Jalandhar	1.02	Palwal	1.03
Barnala	1.00	Sonipat	1.03
Patiala	0.99	Karnal	1.02
Hoshiarpur	0.99	Mahendragarh	0.97
Mansa	0.97	Panipat	0.96
Amritsar	0.97	Rohtak	0.92
Gurdaspur	0.96	Mewat	0.91
S.B.S. Nagar	0.91	Hisar	0.89
Muktsar	0.87	Sirsa	0.85
Rupnagar	0.86	Kaithal	0.85
Firozpur	0.74	Panchkula	0.80
Bathinda	0.73	Ambala	0.77
		Bhiwani	0.75
Regional Average: 1.01			

Source: Worked out by the author.

The highest productivity index had been recorded by the district of Yamunanagar of Haryana while the lowest productivity index had been found in Bathinda district of Punjab, making the regional variation to be 0.64 points. However, at state level, the range of productivity index was 0.63 points and 0.62 points in Punjab and Haryana, respectively, thus, implying that inter-district variations were same in both the states. For further analysis, the districts have been classified under following categories on the basis of productivity index:

A. Areas of Relatively High Productivity Index

The districts having productivity index of more than 1.12 fall in this category. Only seven districts fall in this category, out of which four districts, namely, Moga, Sangrur, Kapurthala and Ludhiana are of Punjab while the remaining three districts, namely, Yamunanagar, Fatehabad and Rewari are from Haryana. The districts of Kapurthala, Ludhiana, Moga, Sangrur and Fatehabad are located in the form of a belt in the central part of the region while the districts of Yamunanagar and Rewari are located in the eastern and southern part (in Haryana) of the region, respectively (Table 2, Fig.2). The production of wheat and rice was very high in these districts with Sangrur leading in the production of rice in the region while it was the second largest producer of wheat in the region. Ludhiana was the second largest

producer of rice and fourth largest producer of wheat in the region. Kapurthala was the largest producer of potato in the region while Moga also produced large quantity of potatoes while Yamunanagar, on the other hand, was the leading district in sugarcane production in the region. Fatehabad was a significant producer of wheat, rice and cotton in the region. Rewari was a significant producer of wheat and obtained good yield of the crop. Interestingly, Rewari and Yamunanagar had low levels of intensity of cropping and irrigation while moderate level of agricultural mechanization. With the exception of Moga, where level of agricultural mechanization was low, all the districts had either high or moderate levels of intensity of cropping, intensity of irrigation and agricultural mechanization.

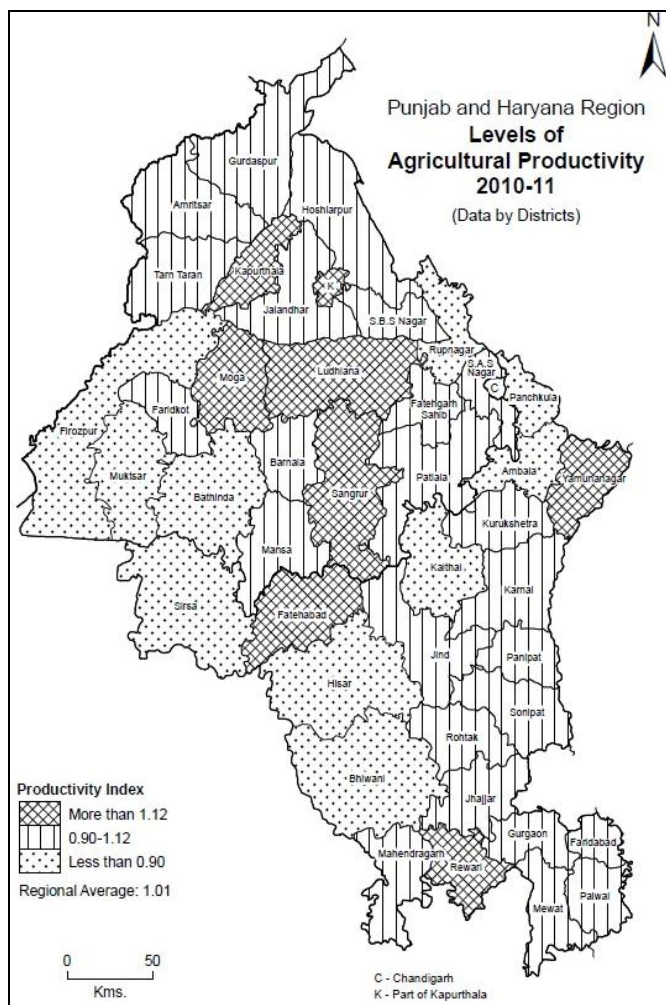


Fig 2

B. Areas of Moderate Productivity Index

The districts having productivity index in the range of 0.90 to 1.12 belong to this category. Out of 24 districts falling in this category, 12 districts, namely, Faridkot, S.A.S. Nagar, Fatehgarh Sahib, Tarn Taran, Jalandhar, Barnala, Patiala, Hoshiarpur, Amritsar, Mansa, Gurdaspur and S.B.S. Nagar are from Punjab while the remaining 12 districts, namely, Faridabad, Jhajjar, Jind, Gurgaon, Kurukshetra, Palwal, Sonipat, Karnal, Mahendragarh, Panipat, Rohtak and Mewat are from Haryana. These districts form two well-

defined belts- one in the northern part (comprising the districts of Gurdaspur, Amritsar, Tarn Taran, Jalandhar, Hoshiarpur and S.B.S. Nagar) and the other in the eastern part of the region (comprising the districts of S.A.S. Nagar, Fatehgarh Sahib, Patiala, Fatehgarh Sahib, Kurukshetra, Karnal, Jind, Panipat, Sonapat, Rohtak, Jhajjar, Gurgaon, Mewat, Faridabad and Palwal) whereas they are found scattered elsewhere (Table 2, Fig.2). There is a dominance of wheat-rice culture in all districts, however, the cultivation of other crops is area specific. The western districts have dominance of cotton cultivation but do not produce sugarcane at all. On the other hand, the relatively moist eastern districts do not cultivate cotton but focus on sugarcane cultivation. Potato is not grown in the central and southern districts of Haryana. Thus, owing to all these differences, the productivity index in these districts became moderate. It is notable that Faridkot, Karnal and Panipat had high levels of intensity of cropping and agricultural mechanization while moderate level of intensity of irrigation. On the other hand, Jhajjar and Gurgaon had low levels of intensity of cropping and intensity of irrigation whereas high level of agricultural mechanization. However, in S.A.S. Nagar, intensity of cropping, intensity of irrigation and agricultural mechanization had low levels.

C. Areas of Relatively Low Productivity Index

All the districts having productivity index less than 0.90 fall in this category. Only 10 districts fall under this category, out of which four districts, namely, Muktsar, Rupnagar, Firozpur and Bathinda are of Punjab while the remaining six districts, namely, Hisar, Sirsa, Kaithal, Panchkula, Ambala and Bhiwani are from Haryana. The districts of Firozpur, Muktsar, Bathinda, Sirsa, Hisar and Bhiwani form an almost continuous belt covering the western part of the region adjoining the international boundary with Pakistan and state boundary with Rajasthan while the remaining districts form an irregular belt in the eastern part of the region (Table 2, Fig.2). The districts covered in this category, except, Panchkula, Ambala, Kaithal and Rupnagar, have western location adjoining the dry zone of Rajasthan. Here, the soils are sandy, rainfall inadequate and relatively low intensity of irrigation, which makes the entire set-up quite unsuitable for rice and sugarcane cultivation. Although Firozpur was the largest producer of wheat in the region but the relatively low yields of crops had resulted in the low productivity index of the district. Panchkula had the minimum area and production of the selected crops in the region and, hence, its inclusion in this category was justified. Rupnagar forms the part of *Kandi* zone which is rather not much productive whereas Ambala and Kaithal have low agricultural productivity which is due to the relatively low yields of the crops. It is interesting to note that Bhiwani had high levels of intensity of cropping and intensity of irrigation while moderate level of agricultural mechanization. Panchkula, on the other hand, had moderate level of intensity of cropping and high levels of intensity of irrigation and agricultural mechanization.

State Level Comparison in Levels of Agricultural Productivity

Although, the agricultural productivity is very high in the region, yet inter-state and inter-district variations do exist.

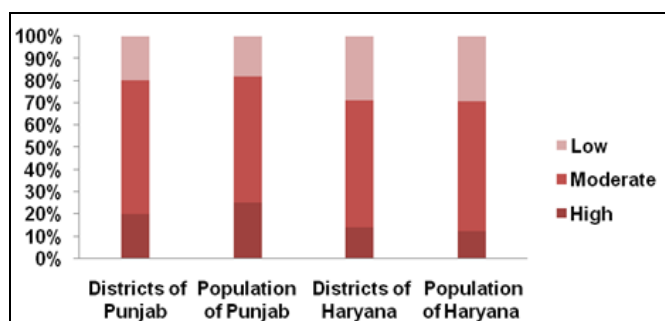
With respect to the levels of agricultural productivity in 2010-11, a comparison has been made between Punjab and Haryana (Table 3).

Table 3: Punjab and Haryana Region: Percentage of Districts and Population falling under various Levels of Agricultural Productivity, 2010-11

Levels of Productivity Index	Punjab		Haryana	
	Percentage of Districts	Percentage of Population	Percentage of Districts	Percentage of Population
High	20	25.09	14	12.04
Moderate	60	56.86	57	58.63
Low	20	18.05	29	29.33
Total	100	100	100	100

Source: Worked out by the author.

20 per cent of districts of Punjab as against 14 per cent of districts of Haryana fell under high level of productivity index. However, the percentage of population falling in this category in Punjab (25.09 per cent) was nearly twice than that of Haryana (12.04 per cent, Table 3). More than half of the districts of Punjab (60 per cent) and Haryana (57 per cent) fell under moderate level of productivity index. Similarly, more than half of the population of both the states fell in this category. One-fifth of the districts of Punjab (20 per cent) in comparison to more than one-fourth of the districts of Haryana (29 per cent) fell under low level of productivity index (Fig. 3). Moreover, less than one-fifth of population of Punjab (18.05 per cent) fell under this category in comparison to more than one-fourth of the population of Haryana (29.33 per cent, Table 3). The study concludes that 80 per cent of districts and 81.95 per cent of population of Punjab against 71 per cent of districts and 70.67 per cent of population of Haryana fell under high and moderate levels of productivity index, thereby, suggesting that the spatial diffusion of agricultural productivity was much higher in Punjab in comparison to Haryana.



Source: Table 3

Fig 3: Punjab and harayana Region: percentage of Districts and population under various Levels of Agricultural Productivity, 2010-11

Conclusion

The region records one of the highest agricultural productivity in the country. The productivity index in Punjab increased from 1.01 in 1970-71 to 1.05 in 2010-11 while, in Haryana, on the other hand, the productivity index decreased from 0.98 to 0.96 during the same period, thus, indicating that the

difference in productivity index between the two states increased from 0.03 points in 1970-71 to 0.09 points in 2010-11. The growth rate of productivity index during 1971-2011 further lends support to this fact as Punjab (3.96 per cent) had recorded a marginal improvement in the growth rate whereas Haryana (-2.08 per cent) had recorded negative growth rate during the same period.

In 2010-11, the productivity index for the region was 1.01 while it was 1.05 for Punjab and 0.96 for Haryana. The high productivity index was recorded by the districts of Yamunanagar, Moga and Sangrur while the districts of Bathinda, Firozpur and Bhiwani had recorded low productivity index. Overall, 20 districts of the region, nine of Punjab and 11 from Haryana, had productivity index higher than the regional average. The highest and lowest productivity index in Punjab was recorded by the districts of Moga and Bathinda, respectively, thus, making the range to be 0.63 points. The highest and lowest productivity index in Haryana, on the other hand, was recorded by Yamunanagar and Bhiwani districts, respectively, and hence the range came to be 0.62 points. Thus, the inter-district variations were same in both the states.

Further, 20 percent districts of Punjab in comparison to 14 per cent districts of Haryana fell under high level of productivity index. However, the percentage of population falling under this category in Punjab (25.09 per cent) was twice than that of Haryana (12.04 per cent). More than half of the districts of Punjab (60 per cent) and Haryana (57 per cent) fell under moderate level of productivity index. Similarly, the percentage of population in this category was 56.86 per cent and 58.63 per cent in Punjab and Haryana, respectively. In Punjab, one-fifth of the districts fell under low level of productivity index while more than one-fourth of districts of Haryana belonged to this category. Similarly, a little less than one-fifth of the population of Punjab in comparison to more than one-fourth of the population of Haryana fell under low level of productivity index. Overall, 80 per cent of districts and 81.95 per cent of population of Punjab against 71 per cent of districts and 70.67 per cent of population of Haryana fell under high and moderate levels of productivity index suggesting that spatial diffusion of agricultural productivity was much higher in Punjab than that in Haryana. Thus, Punjab had performed better than Haryana with respect to the agricultural productivity in the region.

Although, Punjab and Haryana are amongst the most agriculturally developed states of the country, yet the agriculture of these states is facing stagnation. There has not been any substantial rise in the agricultural productivity in Punjab while that of Haryana has displayed negative growth rate. Hence, there is an urgent need to break this jinx and diversify the agriculture of both the states by growing different crops which will be, both, economically and ecologically profitable.

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