

An Analysis Of Crop Diversification In Haryana

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Abstract

Agriculture sector plays a very important role for the economy of Haryana predominantly it is an agricultural economy. The main aim of this paper is to analyse the trend and extent of diversification in Haryana. For fulfilling the above said objectives secondary sources of data taken from various issues of Statistical Abstract of Haryana, Economic Survey of India etc. have been used in the study. The study revealed that area under wheat and rice has increased in the state is on the cost of decrease in area of other rabi and kharif crops such as barley, gram, jowar, bajra, maize etc. Growth in the production of rice and wheat is mainly due to the increase in area under the crops while the area under coarse cereals and pulses have decreased but their productivity has shown the positive trend. On the same scale the overall diversification index has shown decreasing trend over the years as diversification of area towards vegetables is very low as compare to the diversification towards wheat and rice leads to the monocropping pattern in the state.

Keywords: Crop Diversification, Simpson Index of Diversification, Annual Compound Growth Rate.

INTRODUCTION

Paddy is grown almost throughout the year in hot and humid regions of eastern and southern parts of India but it is an autumn (kharif) season crop in the northern parts of the country. The kharif season commences from May-June and comes to an end in Sept-Oct. The temperature for the cultivation of paddy should be fairly high at mean monthly of 24° C. It should be 20°-22°C at the time of sowing, 23°-25° C during growth and 25°-30° C at the harvesting time. The average rainfall required for rice is 150 cm and it is a dominant crop in the areas where average rainfall is above 200 cm annually. Paddy can be grown with the help of irrigation where the average rainfall is less than 100 cm as is done in Punjab, Haryana and Western U.P. and about 40 per cent of paddy is raised under irrigation in India. Paddy can be grown on a variety of soils but deep fertile clayey or loamy soils are considered ideal for raising the crops (Khullar, 2014).

Haryana which is traditionally not a paddy growing state has made tremendous progress in the production of paddy after the introduction of green-revolution by adopting the new agricultural technologies. Nowadays horticulture sector is the fastest growing sector with in agriculture. The diverse agro-climatic conditions of Haryana are favourable for the cultivation of alternate kharif crops including horticulture crops such as vegetables. A large variety of vegetables has been grown in the state Most of the vegetables are of short duration. As a result, two or three crops are raised in one year. Since different vegetables are grown in different seasons, the process of cultivation continues throughout the year. Ladyfinger, tinda, bottle gourd, cucumber, chillies, tomato, carrot, muskmelon, brinjal and bitter gourd are the vegetables of kharif season while peas, onion, potato, palak, methi, raddish, tomato, turnip, capsicum, carrot, bitter gourd and coriander are considered as the important vegetables of rabi season in Haryana.

Hence, in this paper an attempt has been made to highlight the extent of crop diversification in the state.

REVIEW OF LITERATURE

Review of literature is an important exercise in research because it helps the researcher to find out the research gap. A number of research studies have been undertaken by different researchers in the field of crop diversification in India.

Ramphul (2012) examined the performance of Growing Crops in Haryana in his study and revealed that the specialization of wheat was found in Panipat, Hissar and Faridabad, that of Rice was in Kurukshetra, Kaithal and Karnal, Jowar in Rohtak and Faridabad was highest during the study period.

Kumar and Gupta (2015) in their study “Crop Diversification towards High-value crops in India: A State level empirical Analysis” highlighted the trends and patterns in crop diversification. The researchers analysed the data by using Simpson Index of Crop Diversification (SID) and panel regression analysis. The study showed that the area under high-value crops was increased and the agricultural economy of India was diversifying from traditional food grains to high value crops.

Sunita, et al. (2017) in their study “Changing Pattern of Area, Production and Productivity of Principal Crops in Haryana, India” found that wheat and paddy were having a considerable part if total area in rabi and kharif season. Increased in production of paddy and wheat was mostly due to increased area under these crops. Increase in area under Paddy in kharif season was on the cost of the area from bajra and other crops while that of wheat was taken area from gram, sugarcane and other crops of the season.

Halawar (2019) in his study “The Trend Analysis of Major Food Grains in India” elucidated the trend and pattern of major food grains and revealed that the production of food grains observed the declining trend in India. A slight positive correlation was observed between wheat and rice and these two food grains were found non-significant in production despite that these two food grains are the main foods of Indians in their daily routine.

Bansal et al. (2020) elucidated the extent of diversification towards high value crops in Haryana. The authors stated that the area under high value crops has increased for the study period as most of the districts showed increasing percentage of area under these crops. Panipat, Sonapat, Kaithal, Kurukshetra and Karnal were reported as more diversified districts while that of Panchkula, Yamunanagar, Jhajjar and Rewari were comparatively low diversified districts in the state.

RESEARCH METHODOLOGY

The present study is based on secondary data collected from **various issues of Statistical Abstract of Haryana, Handbook of Statistics and Agricultural Statistics at a Glance CMIE Database Department of Horticulture, Haryana**. In this paper statistical tools like ACGR and Simpson Index of Diversification have been used for the analysis of data.

ANALYSIS OF GROWTH RATES

Growth rates of area, production and productivity of major crops in Haryana have been examined in this paper as it helps to observe the tendency of variables to increase, decrease or remain stagnant over a period of time. The estimation of growth rate has been done with the help of a common method of measurement of growth rate namely Annual Compound Growth Rate (ACGR). It also specifies the magnitude of the rate of change per unit of time in the variables under consideration. The Annual compound growth rate (ACGR) is estimated by employing the following formula:

$$Y = ab^t$$

By using logarithm, it may be written as:

$$\text{Log } y = \text{log } a + t \text{ log } b$$

$$Y^* = a^* + t.b^* \text{ (where } \text{log } y = y^*, \text{ log } a = a^* \text{ and } \text{log } b = b^*)$$

The value of b^* is computed by using OLS Method. Further, the value of ACGR can be calculated by followed method:

$$\text{ACGR} = (\text{Antilog } b^* - 1) \times 100$$

SIMPSON INDEX OF DIVERSIFICATION

Simpson diversity index is constructed for Haryana using the following formula.

$$DI_j = 1 - \left(\sum_{i=1}^N P_i^2 \right)$$

Here, DI_j = diversification index of j^{th} component {j = areas of crop}

P_i = proportion of the i^{th} variable (crop/ crop group) in their respective total.

RESULT AND DISCUSSION

Table 1 shows the percentage change in area, production and productivity of major crop in Haryana. It is evident from the table that wheat and rice have dominance over other crops. The area, production and yield of wheat and rice has shown an increasing trend continuously over the period from 1990- to 2019-20

Table 1 Percentage Change in Area, Production and Yield of Major Crops in Haryana

Crop	1990-91 to 2005-06			2005-06 to 2019-20			1990-91 to 2019-20		
	A	P	Y	A	P	Y	A	P	Y
Wheat	24.46	37.55	10.50	10.04	34.16	21.93	36.96	84.50	34.70
Rice	58.30	74.20	9.95	49.00	62.70	9.28	135.80	183.40	20.14
Jowar	-31.07	-60.00	-45.30	-66.50	-38.46	93.80	-76.90	-75.40	6.04
Bajra	3.79	34.20	29.30	-21.97	56.00	100.00	-19.00	109.30	158.70
Maize	-49.70	-26.53	49.80	-65.70	-52.80	32.15	-82.80	-65.30	98.00
Total Cereals	23.34	43.00	16.75	12.58	41.60	24.90	38.85	102.50	45.80
Total Pulses	-73.70	-79.40	-21.60	-62.00	-41.90	52.80	-90.00	-88.00	19.83
Total Oilseeds	50.60	28.86	-14.46	-10.07	43.00	59.10	35.40	84.30	36.10
Total Vegetables	320.60	272.00	-11.54	45.00	96.60	35.60	510.00	632.00	19.95

Source: Statistical Abstract of Haryana

The area and production have decreased from 1990-91 to 2020-21 in case of jowar while that of yield per hectare has decreased from 1990-91 to 2005-06 but the same has increased for the time period 2005-06 to 2019-20. Overall, the yield of jowar has increased with a change of 6.04 per cent positively. The area and production of maize has decreased in all time periods but yield per hectare has increased. This may be due to the introduction of high yielding variety seeds. For the time period 1990-91 to 2005-06 area and production of bajra has increased but the area under the same has decreased for the time period 2005-06-2019-20. Yield per hectare for bajra has increased tremendously with 100 per cent change from 2005-06 to 2019-20 as a result despite being a decrease in area, production has increased. Area and production of pulses has shown declining trend for all the time periods. In case of vegetables the area and production are continuously increasing.

Table 2 Annual Compound Growth Rate in Area, Production and Yield of Major Crops in Haryana

Crop	1990-91 to 2005-06			2005-06 to 2019-20			1990-91 to 2019-20		
	A	P	Y	A	P	Y	A	P	Y
Wheat	1.46	2.14	0.66	0.63	1.97	1.33	1.05	2.06	0.99
Rice	3.10	3.76	0.63	2.69	3.29	0.59	2.90	3.53	0.61
Jowar	-2.44	-5.92	-3.93	-7.02	-3.18	4.50	-4.76	-4.56	0.19

Bajra	0.24	1.98	1.72	-1.64	3.006	4.73	-0.70	2.49	3.21
Maize	-4.47	-2.03	2.73	-6.88	-4.87	1.87	-5.69	-3.46	2.30
Total Cereals	1.40	2.41	1.03	0.79	2.34	1.49	1.10	2.37	1.26
Total Pulses	-8.51	-9.98	-1.60	-6.23	-3.55	2.86	-7.38	-6.82	0.60
Total Oilseeds	2.76	1.70	-1.03	-0.70	2.41	3.14	1.01	2.05	1.03
Total Vegetables	10.05	9.15	-0.81	2.50	4.61	2.05	6.21	6.85	0.60

Source: Statistical Abstract of Haryana

Annual Compound Growth Rate in area, production and yield of major crops in Haryana has been depicted in table 2. Area, production and productivity of wheat has increased with an annual growth rate of 1.05, 2.06 and 0.99 per cent respectively from 1990-91 to 2019-20. On the same scale area, production and productivity of rice is also increasing throughout with an annual compound growth rate of 2.90, 3.53 and 0.61 per cent respectively from 1990-91 to 2019-20. Area and production of bajra has increased with the annual compound growth rate of 0.24 and 1.98 per cent from 1990-91 to 2005-06 while the area under bajra is showing decreasing trend with the annual compound growth of -1.64 per cent from 2005-06 to 2019-20. In case of maize area and production is continuously declining throughout with an annual compound growth rate of -5.69 and -3.46 per cent while per hectare yield has shown increasing trend. This may be due to the introduction of high yielding variety of seeds. Total pulses are showing decreasing trend with negative annual compound growth rate. Area and production of total vegetables has increased throughout with an annual compound growth rate of 6.21 and 6.85 per cent respectively from 1990-91 to 2019-20.

Table 3 Crop Diversification Index of Major Crops in Haryana

Sr. No	Districts	Cereals Diversification index	Vegetables Diversification index	Overall Crop Diversification index
1	1990-91	0.62	0.90	0.76
2	2005-06	0.60	0.92	0.73
3	2019-20	0.58	0.93	0.70

Source: Statistical Abstract of Haryana

Crop diversification has been constructed for Haryana by using Simpson index of Diversification (SID). The value of SID lies between 0 to 1. Further, the index is classified into four categories based on their value from low to very high level of diversification. Index value from 0 - 0.25 represent low level of diversification, 0.25 to 0.50 represent moderate level, 0.50 to 0.75 represent high level and above 0.75 representing very high level of diversification. On

analysing the table 3, it is clear that the diversification is decreasing over the years in case of cereals and overall, as cereals diversification index reveals that the crops are concentrated towards two main crops i.e., wheat and rice and increase in area under wheat and rice is on the cost of other cereals such as jowar, bajra, maize, pulses and oilseeds. There is slight increase in the vegetables' diversification index due to the increase in area under these crops. On the same scale the overall diversification index has shown decreasing trend over the years as diversification of area towards vegetables is very low as compare to the diversification towards wheat and rice leads to the monocropping pattern in the state.

CONCLUSION

Haryana which is traditionally not a paddy growing state has made tremendous progress in the production of paddy after the introduction of green-revolution by adopting the new agricultural technologies. Nowadays horticulture sector is the fastest growing sector with in agriculture. The diverse agro-climatic conditions of Haryana are favourable for the cultivation of alternate kharif crops including horticulture crops such as vegetables. Area under wheat and rice has increased in the state on the cost of decrease in area of other rabi and kharif crops. Growth in the production of rice and wheat is mainly due to the increase in area under the crops while the area under coarse cereals and pulses have decreased but their productivity has shown an increasing trend. The overall diversification index has shown decreasing trend over the years as diversification of area towards vegetables is very low as compare to the diversification towards wheat and rice leads to concentration towards wheat and rice.

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