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## To examine extent of diversification towards high value crops in Haryana

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### Abstract

Agricultural diversification from the theoretical point of view may be as diversification of resources from low income generating crops to high income generating crops. In developing countries like India starts with a gradual shift towards diversification. The study was based on secondary data regarding area, production and productivity of different crops in Haryana which was collected from different published sources for the period 2006-07 to 2016-17. Simpson index of crop diversification was worked out to examine extent of crop diversification in Haryana at state and district level based on secondary data for last ten years. The study shows that among high value crops (fruits and vegetables) and other crops (cereals, pulses, oilseeds, cotton and sugarcane), the area under HVC's has increased in all time period in Haryana. It shows that in Haryana, the area is diversifying towards high value crops since 2006-07. The study reveals that in most of the districts in Haryana showed increasing change in percentage of area under HVC's than the other crops.

**Keywords:** Diversification, area, production, simpson index and Haryana

### Introduction

Diversification is an important part of the changing economy. Conceptually the term "diversification" has been derived from the word "diverge" which means to move or extend in the direction different from a common point (Jha *et al.*, 2009) [3]. In Agriculture, diversification can be defined as shift from the regional dominance of one crop (like rice) to another crops (like oilseeds), or from one enterprise (like crop based) to another enterprise (like livestock) or to engage in other complimentary activities (Vyas, 1996). Agricultural diversification from the theoretical point of view may be considered as diversification of resources from low income generating crops to high income generating crops. In developing countries like India starts with a gradual shift towards diversification.

India, in context of rural areas the percent share of high value crops (HVCs) in the total food spending has increased up to 39 percent in 1991-2000 from 31 percent in 1983 and in urban area it has increased up to 50 percent in 1991-2000 from 41 percent in 1983 (Kumar and Mruthyunjaya, 2002) [6]. High growth of urbanization with increase in per capita income is the main reason behind the shift in the consumption pattern towards HVC like fruits and vegetables (Joshi *et al.*, 2004) [5]. However, technological advances in communication, logistics, and marketing system have induced supply-side growth of non-food crops (Joshi, 2005) [4].

The state of Haryana, since the early years of its creation, has emerged as one of the forerunners of agricultural prosperity in the country. Along with Punjab and Uttar Pradesh, Haryana championed the Green Revolution and focused on high yield cropping system thus helping India to overcome the acute food deficit from 1960s onwards (CRRID Report, 2017). Introduction of high end technology, improved socio-economic infrastructure, adequate geo-climatic conditions, high yield crop varieties, research and development complemented with unswerving state intervention pushed Haryana towards agricultural prosperity. In the following years, the state achieved remarkable success in per hectare production and helped India in achieving self-sufficiency in food grains especially in rice/paddy and wheat.

**Sampling Framework:** The secondary data regarding area, production and productivity of different crops in Haryana was collected from different published sources like Department of Agriculture and Co-operation Network (DACNET), Indiastat, statistical abstract of Haryana, Agricultural Statistics at Glance and Horticulture at Glance etc for the period 2006-07 to 2016-17.

**Methodology:** To examine extent of crop diversification in Haryana at state and district level based on secondary data for last ten years, Simpson index of crop diversification was worked out. The Simpson index of crop diversification (SID) is given by equation:

$$SID = 1 - \sum_{i=1}^n P_i^2$$

where,

$P_i$  is the proportionate area of  $i^{\text{th}}$  crop in the gross cropped area.

The Simpson index of diversification (SID) ranges between 0 and 1, where in the value closer to 1 indicates high diversification and the value closer to 0, indicates no diversification. To show the diversification towards high value crops in selected districts of Haryana, percentage increase in area under high value crops and other crops was compared with the help of suitable tables.

**Results and Discussion:** The extent of crop diversification in India for the year 2006-07 and 2016-17 is presented in the table 2. The table 2 classifies different Indian states defining the extent of crop diversification under major crops which included total cereals, pulses, oilseed, cotton, sugarcane, fruits and vegetables. The value of Simpson index ranges from 0 to 1, wherein value closer to 0 indicates low diversification and value closer to 1 indicates high diversification.

**Table 2:** Crop diversification index in India

State	Simpson index value	
	2006-07	2016-17
Andhra Pradesh	0.93	0.81
Bihar	0.93	0.35
Chattisgarh	0.99	0.44
Haryana	0.57	0.54
Himachal Pradesh	0.35	0.29
Maharastra	0.76	0.83
Punjab	0.39	0.29
Rajasthan	0.76	0.79
Tamil Nadu	0.99	0.74
Uttar Pradesh	0.50	0.54
West Bengal	0.94	0.58
Others	0.64	0.67

**Source:** Calculation based on area data for crops taken from Statistical Abstract of Haryana

The result presented in the table 2 revealed that high diversification has been recorded for Maharastra (0.83) in the year 2016-17, whereas low diversification has been recorded for Himachal pradesh (0.29). However, it can be concluded from the table that there was slight change in diversification index from the year 2006-07 to 2016-17 in Haryana with Simpson index value of 0.57 and 0.54 respectively while in other states like Bihar, Chattisgarh, Tamil Nadu and West

Bengal has shown declining change in diversification index from 2006-07 to 2016-17.

The computed values of Simpson index are presented in the table 3 district-wise for the state of Haryana for the period 2006-07 and 2016-17. The table classifies different districts defining the extent of crop diversification under major crops which included total cereals, pulses, oilseed, cotton, sugarcane, fruits and vegetables.

**Table 3:** District-wise crop diversification index in Haryana

District	Simpson index value	
	2006-07	2016-17
Ambala	0.39	0.32
Panchkula	0.44	0.33
Yamunanagar	0.51	0.33
Kurukshetra	0.33	0.42
Kaithal	0.21	0.22
Karnal	0.24	0.20
Panipat	0.28	0.31
Sonipat	0.37	0.46
Rohtak	0.55	0.34
Jhajjar	0.52	0.34
Faridabad	0.53	0.44
Palwal	-	0.40
Gurugram	0.31	0.21
Nuh	-	0.53
Rewari	0.58	0.52
Mahendragarh	0.71	0.68
Bhiwani	0.72	0.65
Jind	0.44	0.41
Hisar	0.71	0.72
Fatehabad	0.55	0.48
Sirsa	0.72	0.65
Haryana	0.57	0.54

**Source:** Calculation based on area data for crops taken from Statistical Abstract of Haryana

The persual of table 3 reveals that during 2006-07 that except districts Kaithal (0.21), Karnal (0.24) and Panipat (0.28), all other districts were relatively more specialized districts with higher Simpson index value. For the year 2016-17 except Mahendargarh (0.68), Bhiwani (0.65), Hisar (0.72) and Sirsa (0.65), all other districts depicted Simspson index value lower than 0.60 i.e. relatively more specialized. However, these district are experiencing a lateral movement towards crop specialization and the crop diversification is not happening. Though Mahendargarh, Bhiwani, Hisar and Sirsa recorded higher Simpson index value but the crop diversification is not happening due to adoption of same cropping pattern over the years.

**Table 4:** Percentage change in area under different crops in Haryana

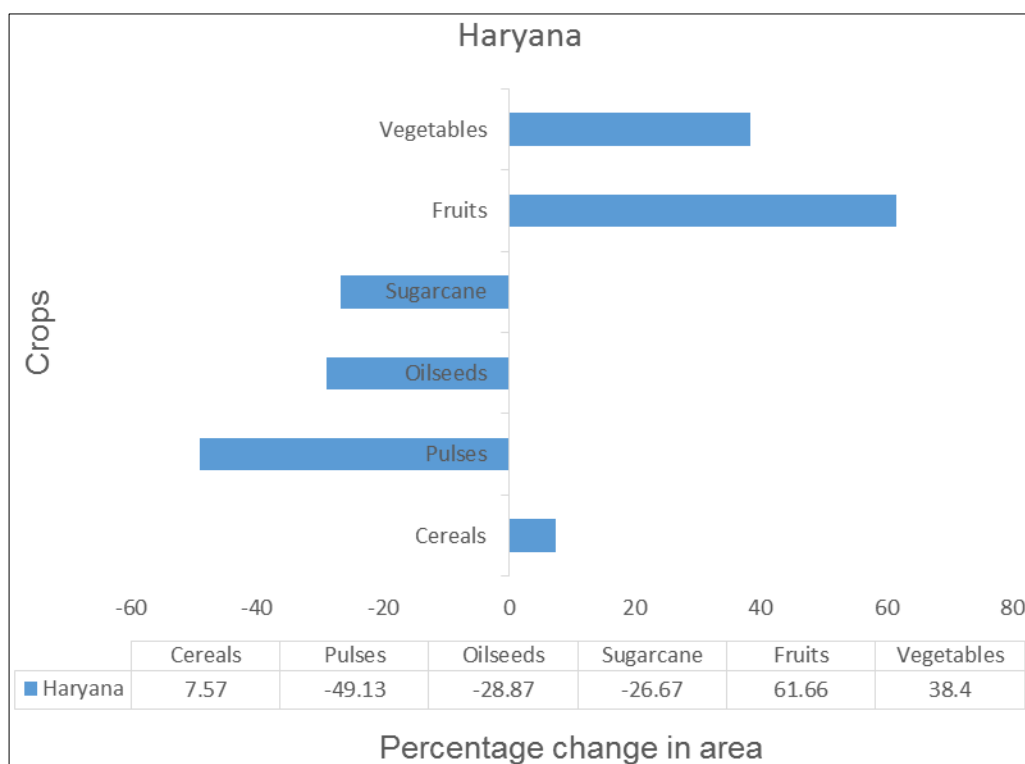
Districts	Cereals	Pulses	Oilseeds	Sugarcane	Fruits	Vegetables
Ambala	10.58	-39.13	66.67	-31.58	19.31	9.47
Panchkula	59.00	-50.0	18.18	-14.29	6.73	53.47
Yamunanagar	30.24	-68.18	-35.90	-40.33	17.28	33.96
Kurukshetra	7.41	100	23.64	-39.38	46.02	0.79
Kaithal	1.29	-75	-22.22	-5.88	74.56	18.37
Karnal	3.85	-57.14	33.33	-13.01	60.04	39.59
Panipat	-3.01	0	25.00	-35.90	57.84	165.71
Sonipat	18.13	-95.8	-60.61	-33.33	237.35	74.47
Rohtak	27.32	-90.9	-18.38	-27.42	17.34	76.51
Jhajjar	31.01	-78.08	-30.37	12.00	69.52	18.07
Faridabad	-70.95	-98.82	-100.0	-79.17	-15.03	-23.77
Palwal	-	-	-	-	27.67	11.59
Gurugram	5.95	-20	-31.88	-	77.70	-34.45

Nuh	18.27	-21.05	-24.04	-77.78	-	-
Rewari	30.0	-100	-0.62	-	84.83	43.99
Mahendragarh	141.38	-65.04	-5.74	-	-	-
Bhiwani	47.25	-69.49	12.05	5.26	48.17	11.73
Jind	6.85	-100	-27.27	-43.40	34.97	50.07
Hisar	8.86	-14.78	45.11	-48.15	73.12	37.83
Fatehabad	14.08	-76.19	101.32	-71.43	89.07	45.84
Sirsa	26.83	56.8	8.94	-	62.12	47.83
Haryana	7.57	-49.13	-28.87	-26.67	61.66	38.40

**Source:** Calculation based on data of area for crops taken from Statistical Abstract of Haryana

Thus, the decline of the Simpson Index clearly suggests a trend towards specialization. This specialization is in favour of more remunerative crops like fine cereals and oilseeds. The district of Kurukshetra, Sonipat and Panipat are an exception as Simpson indices increased in 2016-17 over the previous years. It may be noted that these district have been in the forefront of intensive agriculture practices. There are also

evidences of farmers adjusting to the above degradation by decreasing acreage under paddy and wheat and increasing acreage under fruit and vegetable crops. The following has been concluded by percentage change in area under major crops for the period 2006-07 to 2016-17 which is shown in table 4 which signifies the extent of diversification towards high value crops like fruits and vegetables.



**Fig 1:** Percentage change in area under major crops in Haryana

Table 4 reveals that district Sonipat and Panipat were more diversifying towards fruits and vegetables with maximum percentage change in area over the years whereas, district Faridabad showed the least percentage change in area under fruits (-15.03) and vegetables (-23.77). However, it is also evident from the table 4 that only district Faridabad showed negative percentage change in area under all the major crops as the district is undergoing industrial development rather than agricultural development.

### Conclusion

The study shows that among high value crops (fruits and vegetables) and other crops (cereals, pulses, oilseeds, cotton and sugarcane), the area under HVC's has increased in all time period in Haryana. It shows that in Haryana, the area is diversifying towards high value crops since 2006-07. The study reveals that in most of the districts in Haryana showed increasing change in percentage of area under HVC's than the other crops. The study finds that districts Sonipat, Kaithal,

Panipat, Karnal and Kurukshetra were more diversified district while, Yamunanagar, Panchkula, Rewari and Jhajjar were comparatively low diversified districts. There has been a significant increase in the percent of area under fruits and vegetables. On this account, a threat to the availability of fine cereals is however a long drawn one since the crop diversification trends from states like Haryana are not necessarily supportive to the diversification trend as available at the aggregate level.

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