

REGIONAL DISPARITIES IN CROPS COMBINATION IN NATIONAL CAPITAL REGION OF HARYANA: A SPATIAL TEMPORAL ANALYSIS

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ABSTRACT

Since the majority of people living in rural areas depend on agriculture either directly or indirectly for their livelihood, agriculture is essential to the growth of any economy. An analysis of the agricultural crop combination scenario in the Haryana National Capital Region has been attempted in this research. One crucial component of agricultural geography is a crop combination region. It provides information on a region's agricultural income and topography. This region offers the regional significance and crop strength to support appropriate devices for planned improvements in the less developed regions. The present study is based on secondary sources of data. This study aims to examine the crop combination regions in the NCR district for the years 1991–92, 2001–02, and 2011–12. The crop combination method developed by Weaver is used to compute the crop data. Crop combinations in these districts are influenced by soil, drainage, temperature, and rainfall.

Keywords: Regional Disparities, Agricultural Crop Combination Scenario, Crop Data, Crop Strength.

Introduction

Combinations of crops are usually cultivated. In geographical research, the analysis of crop combinations in every given area has become more significant. It provides us with the relative location of crops within a region. A scientific tool for examining the current relationships between crops and how land is used is the idea of crop combination. (Comrade, 1979) Most of the time, crops are grown in combination; very rarely does one crop stand alone in a certain area from the other crops. A growing number of agricultural land-use planners and geographers are focusing on the concept of crop combination. The study of crop combinations will be helpful for the development of sustainable agriculture and useful for the rotation of crops and the increase in per-hectare yield (Sangita and Sonwane 2011). One of the most important tools for researching agricultural patterns is combination analysis, which is also useful for offering an adequate basis for regional planning in rural areas. The idea of a monoculture—producing or cultivating one crop in a field at a time, taking up 100% of the space—rarely exists in any geographic area since having multiple crops allows for year-round agricultural cultivation regardless of the season. For the growth of the agricultural sector, crop combination plays a crucial role in comprehending and analyzing the cropping pattern and crop concentration in any given area. Crop combination regions are identified using a wide range of methods. Weaver's (1954) statistical technique is used to establish the crop combination and assess the changing cropping pattern. The present study deals with spatial patterns of crop combinations in the national capital region of Haryana in 1991–92, 2001–02, and 2011–12.

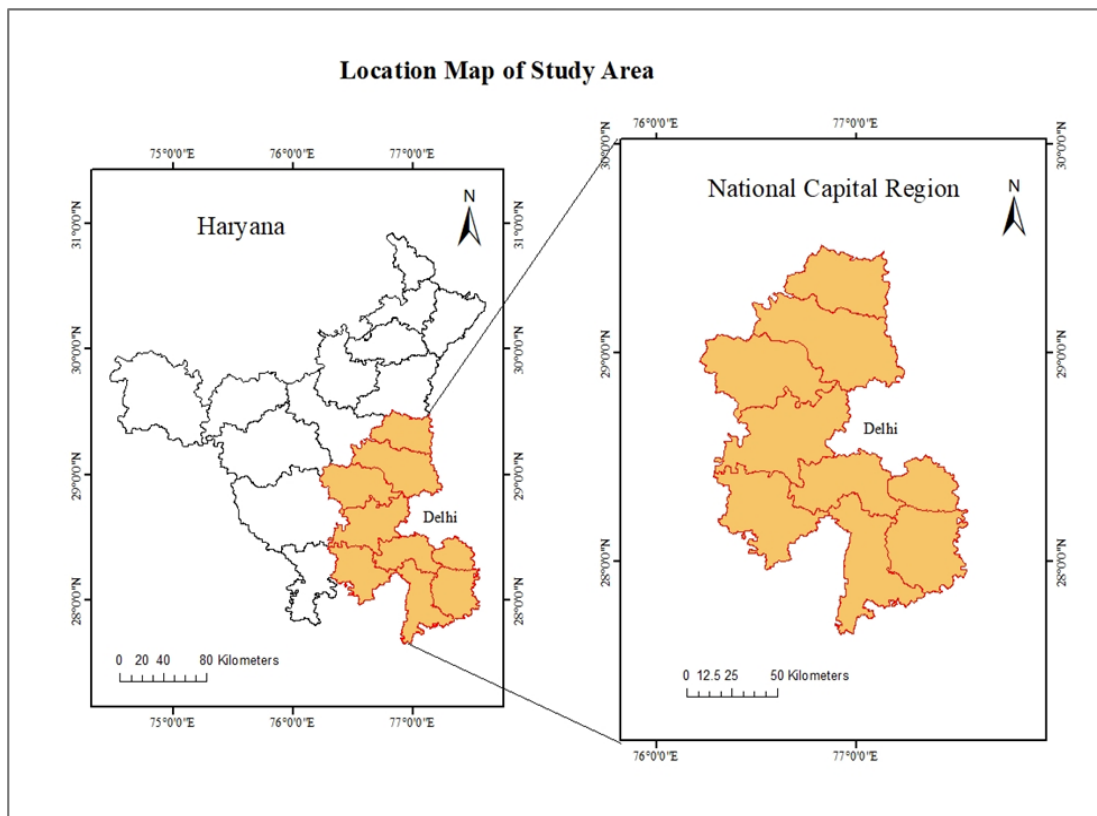
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Study Area

Delhi, the National Capital, has been facing unprecedented growth, which has been a cause of serious concern to the Central Government. It has been recognized that the planned growth of Delhi is possible only in a regional context. In fact, the need for a regional approach was felt as early as 1959, when the draft Master Plan for Delhi was prepared. Thereafter, the Master Plan of 1962 recommended that a statutory National Capital Region Planning Board be set up to ensure balanced and harmonized development of the region. Haryana Sub-region comprises Faridabad, Gurgaon, Rohtak, Sonapat, Rewari, Jhajjar, Mewat, Palwal, and Panipat districts. This accounts for 30.33% (13,413 sq. km) of the area of the state and 39.95% of the area of the NCR. The National Capital Region lies between 27° 03' and 29° 29' North latitude and 76° 07' and 78° 29' East longitude. The region includes the National Capital Territory of Delhi (earlier Union Territory of Delhi) and parts of the States of Haryana, Rajasthan, and Uttar Pradesh.

Map 1



Objectives

The main objective is to find out the crop combination region in the National Capital Region of Haryana and evaluate the change in the crop combination region during the period of 1991–92, 2001–02, or 2011–12 in the study region.

To calculate the weaver's minimum deviation method in the district.

Data Base and Methodology

The main source of data for the entire work is secondary data, which was gathered from the Haryana Statistical Abstract. The Weaver crop combination method has been used to calculate crop combinations.

$$\sigma = \frac{\sum d^2}{n}$$

σ = difference of variance

d = difference between the actual crop percentage in given areal unit

n = number of crops in a given combination

The theoretical curve for the standard measurement was employed as follows –

- Monoculture (single/one crop) = 100 % of the total harvested crop land in one crop.
- Double crop combinations (two crop combination) = 50 % in each of the two crops.
- Three crop combinations = 33.33 % in each of the three crops.
- Four crop combinations = 25 % in each of the four crops.
- Five Crop Combinations = 20 % in each of the five crops.
- Six Crop Combinations = 16.66 % in each of the Six crops
- Seven Crop Combinations = 14.28 % in each of the Seven crops
- Eight Crop Combinations = 12.5 % in each of the Eight crops

Maps prepared to indicate the crop combinations in a NCRD district are delimited into monoculture, two crop combinations, three crop combinations, etc. Using Arc GIS 10.8.

Result and Discussion

For the analysis of crop combinations, first the percentage of different crops during the Kharif and Rabi seasons in the total cropped area has been calculated. Crops with a real coverage of less than one percent are not included in the analysis of crop combinations as they are insignificant as compared to dominated crops.

Crops Combination (1991-92)

It is seen from Table 1 that during the period of 1991–92, no district of NCR, Haryana was in the monocrop category. One district (Panipat) had three crop combinations, which accounted for 33.33% of the district's theoretical base. 50% of the districts (Gurugram, Sonipat, and Rewari) had three crop combinations. 16.67% of districts had one crop category, and only Rohtak district had eight crop combinations. Wheat, rice, and sugarcane are three crop combinations. In Rewari and Gurgaon districts, five crop combinations were made: wheat, Rape seed mustard, Bazara, Barley and Gram. In Sonipat districts, there are also five crop combinations, such as wheat, Rice, Sugarcane, Rape seed mustard, and Barley. (**Table.1, Fig no. 1**)

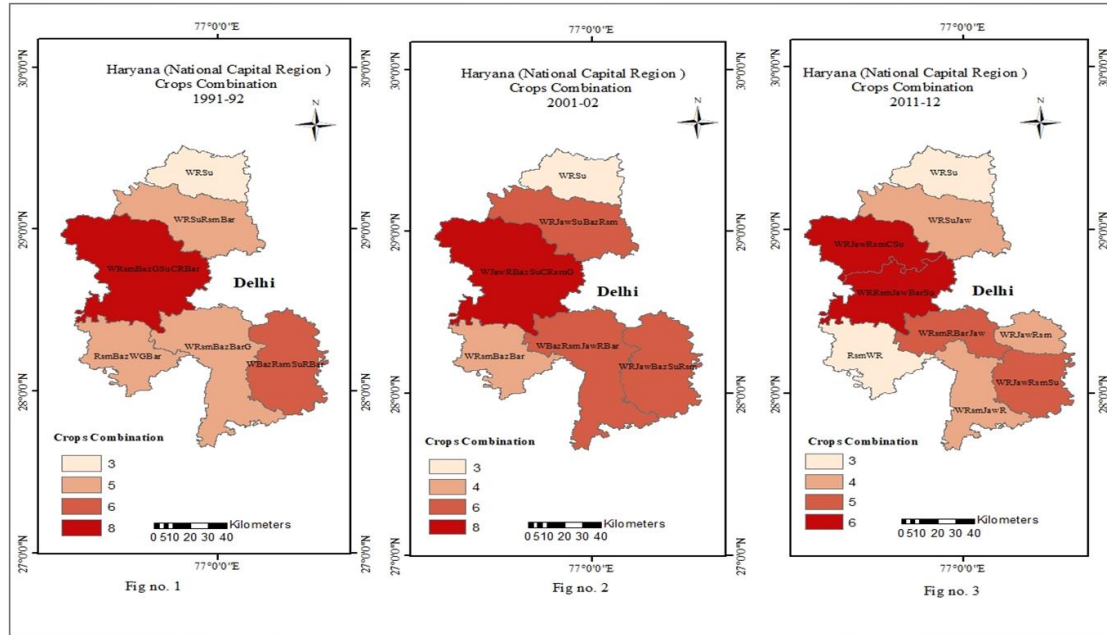
Crops Combination (2001-02)

There was no district that had a monocrop combination in 2001–02. One district (Panipat) had three crops (wheat, rice, and sugarcane), which made up 33.33% of the total districts. Rewari District include under four crop (wheat, rape seed mustard, bazara and barley) combinations .Faridabad (wheat, rice, jawar, bazara, sugarcane, and rape seed mustard), Gurugram (wheat, Gurugram (Wheat, Bazara, Rape seed mustard, jawar, rice, and barley), and Sonipat (wheat, rice, Jawar, Sugarcane, Bazara, Rape seed, and mustard) districts had six crop combinations, and only Rohtak district had eight crops (Wheat, Jawar, Rice, Bazara, Sugarcane, Cotton, Rape seed mustard, and Gram) combination.(Table.1, Fig no. 2)

Crops Combination (2011-12)

In 2011–12, no district of the NCR was under the monocrop category. Two districts, Panipat (Wheat, Rice and Sugarcane) and Rewari (Rape Seed Mustard, Wheat, and Rice), made three crop combinations, which had a theoretical base of 33.33%. Three districts: Faridabad (Wheat, Rice, Jawar, Rape Seed Mustard), Mewat (Wheat, Rape Seed Mustard, Jawar, Rice), and Sonipat (Wheat, Rice, Sugarcane, Jawar) had four crop combinations, and two districts, Gurugram (Wheat, Rape Seed Mustard, Rice, Barley, Jawar) and Palwal (Wheat, Rice, Jawar, Rapeseed Mustard, Sugarcane) had five crop combinations, and Jhajjar (Wheat, Rice, Jawar, Barley, Sugarcane) or Rohtak (Wheat, Rice, Jawar, Rape Seed Mustard, Cotton and Sugarcane) also had six crop combinations where the agriculture is more diversified. (Table.1, Fig no. 3)

Maps describe the Haryana (National Capital Region) Crops Combination Region according to Years 1991-92, 2001-02 & 2011-12



Based on Weaver crops combination method

Table 1: Crops Combination(National Capital Region)

Crops Combination	1991-92			2001-02			2011-12		
	1	2	3	1	2	3	1	2	3
Three crops combination	Panipat	33.33%	W+R+Su	Panipat	33.33%	W+R+Su	Panipat	33.33%	W+R+Su
Four crops combination	-	25%	-	Rewari	25%	W+Rsm+Baz+Ba	Rewari	-	Rsm+W+R
	-	-	-	-	-	-	Faridabd.	25%	W+R+Jaw+Rsm
	-	-	-	-	-	-	Mewat	25%	W+Rsm+Jaw+R
	-	-	-	-	-	-	Sonipat	25%	W+R+Su+Jaw
Five crops combination	Gurugram	20%	W+Rs m+Baz+Ba+G	-	20%	-	Gurugram	20%	W+Rsm+R+Bar+Jaw
	Rewari	20%	Rsm+Baz+W+G+Ba	-	-	-	Palwal	20%	W+R+Jaw+Rsm+Su
	Sonipat	20%	W+R+Su+Rsm+Ba	-	-	-	-	-	-
Six crops combination	Faridabad	16.67%	W+Baz+Rsm+ Su+R+Ba	Faridabad	16.67%	W+R+Jaw+Baz+ Su+Rsm	Jhajjar	16.67%	W+R+Rsm+Jaw+Bar+Sug
	-	-	-	Gurugram	16.67 %	W+Baz+Rsm+Jaw+R+Bar	Rohtak	16.67%	W+R+Jaw+Rsm+C+Su
	-	-	-	Sonipat	16.67%	W+R+Jaw+Su+Baz+Rsm	-	-	-
	-	-	-	Rohtak	12.5%	W+Jaw+R+Baz+ Su+C+Rsm+G	-	12.5%	-

- Districts
- Percent theoretical base
- Name of crops

Note: W=Wheat, R=Rice, Su=Sugarcane, Baz=Bazara, Ba=Barley, Rsm=Rape seed and mustard ,C= Cotton, G=Gram, J=Jawar

Source: Calculations are based on Weaver crops combination Method.

Conclusion

A disparity of twenty years shows not much change in crop combination as expected due to globalisation. Changing the cropping pattern increases agricultural productivity. Crop combinations are important in agriculture. Farmers that have viable choices for cultivating a variety of crops on their land are given special consideration because of the combination of crops. The research area's detailed crop combination analysis shows that the primary crops in NCR (Haryana) are wheat, rape seed and mustard, along with rice and bazara, as the majority of the region has fertile soil, proper irrigation, and a sophisticated agricultural infrastructure. This analysis also shows that farmers are cultivating fewer crops as a result of the adoption of green revolution advancements in infrastructure for agriculture, organizational reforms, government policies, etc. The use of new techniques in agriculture operations caused a significant shift in the crop combination during the investigation period. Thus, farmers are

increasingly growing a variety of crops that improve soil fertility. So, eight crop combinations are observed in Rohtak district. It clearly indicates that the farmers of the district are aware of the environmental conditions, soil fertility, and favorable cropping patterns. In the present study, crop combinations were studied using Weaver's method, and it was observed that wheat, mustard, bazara, and rice are predominant crops. It shows that the study region has witnessed marked changes in the agricultural scenario.

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