



CHANGING SCENARIO OF AGRICULTURE IN PANIPAT DISTRICT, HARYANA

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ABSTRACT

The main factor behind the development of agrarian economy of the Haryana is dominating rural landscape and the hard working nature of cultivators. Sustainability of agricultural production depends, besides irrigation, on several other factors such as climate, hydrology, soils and land use, demography, ecology, environment and other related aspects. This paper deals with the spatio-temporal block level changes in cropping pattern, cropping intensity and crop combination due to increased water resources for irrigation. Improvements in the irrigation infrastructure have increased the net area sown and double the cropped area. Analysis of cropping pattern reveals that emphasis has shifted from coarse food grains to fine food grains and sugarcane.

Keywords : *cropping pattern, cropping intensity, crop combination, water resources, intensity of irrigation.*

Introduction

Panipat is located at 29.39° N and 76.97° E with an area of 1268 sq km. It has an average elevation of 219 metres. The district included five blocks i.e. Panipat, Israna, Madlauda, Bapoli, Samalkha. Panipat is an ancient and historic city in Haryana. Agriculture occupies the foremost

place in the economy of the country as more than seventy per cent of population is engaged in cultivation. In view of increasing pressure of population on land and growing demand for food, the pattern of land utilization has acquired a special significance in India. The pace of development in agriculture was tardy in the early years of independence. As the result, India faced the problem of scarcity of food. Therefore, agricultural sector was given utmost priority in first five - year plan 1951-55. It was realized that without a considerable increase in agricultural production, it would not be possible to sustain a high growth of industrial development as well as economic growth of the country. Singh, A.L. (1992) expressed in her paper “Impact of different source of irrigation on cropping pattern, yields and farms practices” that irrigation is the life line of agriculture and it has assumed greater importance after the introduction of modern technology in agriculture. Her study indicates that performance of farms having their own electric or diesel. Tube wells were much better as compared to farms having canal irrigation or those which were irrigated on hired water. She also pointed that the excessive withdrawal of groundwater by tube wells is leading towards the decline of water table which cause environmental imbalances productivity and lesser land being tilled. Singh, Jhujjar (1994) said in his paper “Tube well irrigation and spatial organization of agriculture” that in an Indian situation, a tube well, besides being a dependable source of water functions as a nodal place for the movement of many other inputs. Accordingly, more water demanding, intensive and valuable crops concentrate near its location pushing other crops (maize, fodder etc.) to outer fields. Tube wells play a magnetic role.

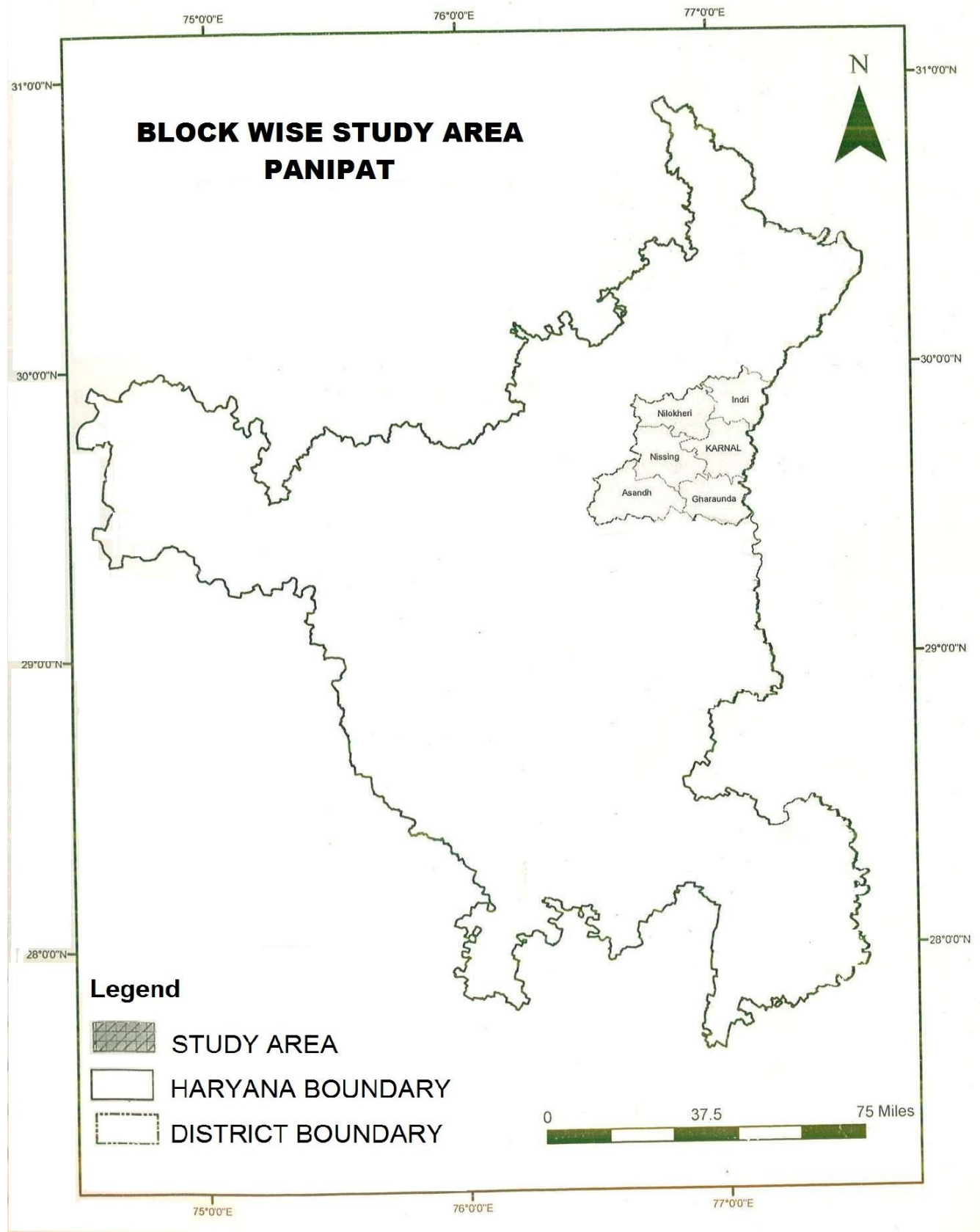


Fig1

The agriculture development in the area has put tremendous pressure on the groundwater reservoir. Improvements in the irrigation infrastructure have increased the net area sown and double the cropped area. Analysis of cropping pattern reveals that emphasis has shifted from coarse food grains to fine food grains and sugarcane. The vast fertile alluvial plains of Panipat district which is the food bowl of Haryana ensure the food security of the nation are suffering under water stress. The study of changed cropping pattern not only provides base for understanding the complex structure of agriculture of the study region but also helps for better planning in the conjunctive use of the available water resources.

Objectives

The present study aims at realizing the following set of objectives:

- To study the changing trends in sources of irrigation.
- To study the changing trends in cropping pattern and crop combination.

Data Base and Methodology

The proposed block wise research was based on secondary data collected from various offices and organizations of the district. The research area is divided into five blocks. The block wise associated changes in sources of irrigation, intensity of irrigation, cropping pattern and cropping intensity the data of blocks had been obtained from BDO (Block Development Office) for the agricultural years 1970-71 and 2005-06.

Techniques

Tube well Irrigation Concentration

The concentration of tube well irrigation in the blocks of the study region is calculated by simple equation:

$$LQ/C = \frac{Twb/Tib}{Twr/Tir}$$

Whereas,

C = Concentration of tube well irrigation (location).

Twb = Tube well irrigation area in block.

Tib = Total irrigated area in block.

Twr = Tube well irrigated area in region.

Tir = Total irrigated area in region.

Crop Combination

To know the crop combination of the region *Doi's* technique is used.

Correlation

Co-efficient between the area under major crops and depth to water level is calculated by the following formula:

Where,

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{\sum X^2 - \frac{(\sum X)^2}{N}} \sqrt{\sum Y^2 - \frac{(\sum Y)^2}{N}}} \quad r = \text{Correlation coefficient.}$$

X = Sum of the x variables (percentage area under major water demanding crop).

Y = Sum of the y variables (depth of water level).

N = Number of variables

Sources of irrigation

Irrigation is available from various sources. Conjunctive use of surface water and groundwater is required for better agricultural development. Groundwater can be tapped to yield bumper crops. In study area groundwater can be utilized for irrigation in the Rabi season when the quantity of water required by crops is usually low in contrast to kharif crops especially paddy. Availability of perennial irrigation encourages the farmers to adopt more scientific techniques as well as intensive cultivation. In blocks of Panipat district tube well is more common but to some extent canal irrigation was used in 1970-71. During 2005-06 share of canal irrigation is negligible.

TABLE 1 BLOCK-WISE SOURCES OF IRRIGATION IN 1970-71**(AREA IN HECTARES)**

Blocks	Tube well	Canal	Other source	Total	Net area cultivated
Panipat	4746.15 (57.28)	1592.31 (19.22)	1946.96 (23.5)	8285.42	10399.59
Madlauda	1173.28 (13)	7187.04 (79.66)	661.94 (7.33)	9022.26	17236.83
Israna	1717 (13.44)	10034.82 (78.58)	1017.81 (7.9)	12769.63	20901.2
Samalkha	4536.63 (38.86)	1967.61 (16.85)	5168.83 (44.28)	11673.07	13527.32
Bapoli	2714.17 (25.67)	124.7 (1.12)	7731.58 (73.14)	10570.45	17440.89

Source: Census of India (1971): Primary Census Abstract, 1971, Series 6, Directorate of Census Operation, Haryana.

- Value in percentage

TABLE 2 BLOCK- WISE SOURCES OF IRRIGATION IN 2005-2006**(AREA IN HECTARES)**

Blocks	Tube well	Canal	Other source	Total	Net area cultivated
Panipat	4850.20 (82.84)	1004.45 (17.15)	--	5854.66	16679
Madlauda	6356.28 (57.54)	4691.09 (42.46)	--	11047.37	25571
Israna	3346.56 (37.79)	5507.70 (62.20)	--	8854.25	20435
Samalkha	6365.59 (88.25)	846.96 (11.74)	--	7212.55	17422.6
Bapoli	7028.34 (100)	--	--	7028.34	17147.6

Source: Director of Agriculture, (2006-06) Haryana

In 1970-71, as reveal from the table 1 only Bapoli block maximum (73.14 per cent) cultivable land was irrigated by the other sources of irrigation like ponds, rahat, wells etc. and followed by Samalkha (44.28 percent). Maximum canal irrigation was used by Madluada (79.66 percent) and Israna (78.58 percent) blocks. Panipat block adopted maximum tubewell irrigation (table 1).

In 2005-06 situations had been changed. Block wise maximum tube wells as the source of irrigation was using by Bapoli (100 per cent) whereas, in 1970-71 the agriculture of this block was mainly depend upon the other sources of irrigation i.e. 73.14 per cent. And canal water as irrigation is absent or negligible in Bapoli. Other sources of irrigation was also absent in 2005-06 (table 2).

Extent of irrigation

Extent of irrigation is the percentage ratio between net irrigated areas to the net sown area.

$$\text{Extent of irrigation} = \frac{\text{Net Area Irrigated}}{\text{Net Sown Area}} \times 100$$

The extent of irrigation in the study area increased by 99.89 per cent (Panipat) in 2005-06 which was 52.34 per cent (Madlauda) in 1970-71. This double increase due to the development of irrigation (fig 2). The highest change in extent of irrigation have been seen in Madlauda (46.14 per cent). The lowest change in extent of irrigation have been noticed in Samalkha (11.13 per cent).

TABLE 3 BLOCK-WISE EXTENT OF IRRIGATION IN STUDY AREA

Block	1970-71	2005-06	Change during study period (1970-71 to 2005-06)
Panipat	79.67	99.89	20.22
Madlauda	52.34	98.48	46.14
Israna	61.09	98.43	37.34
Samalkha	86.29	97.42	11.13

Bapoli	60.61	95.90	35.29
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Source: (I) Census of India (1971): Primary Census Abstract, 1971, Series 6, Directorate of Census Operation, Haryana.

(II) Director of Agriculture, (2005-06) Haryana

Density of Tubewells

There is an immense increase in the growth of groundwater abstraction structures due to augmentation of tube wells and electrification of villages. In 2005 there was 21.48 tube wells per square km in Panipat, (Statistical Abstract 1991-92 Haryana).

In 2005-06, there was 52 tube wells per square Km in Panipat district, (Statistical Abstract 2006- 07 Haryana).

TABLE 4 BLOCK-WISE DENSITY OF TUBE WELL IN STUDY AREA

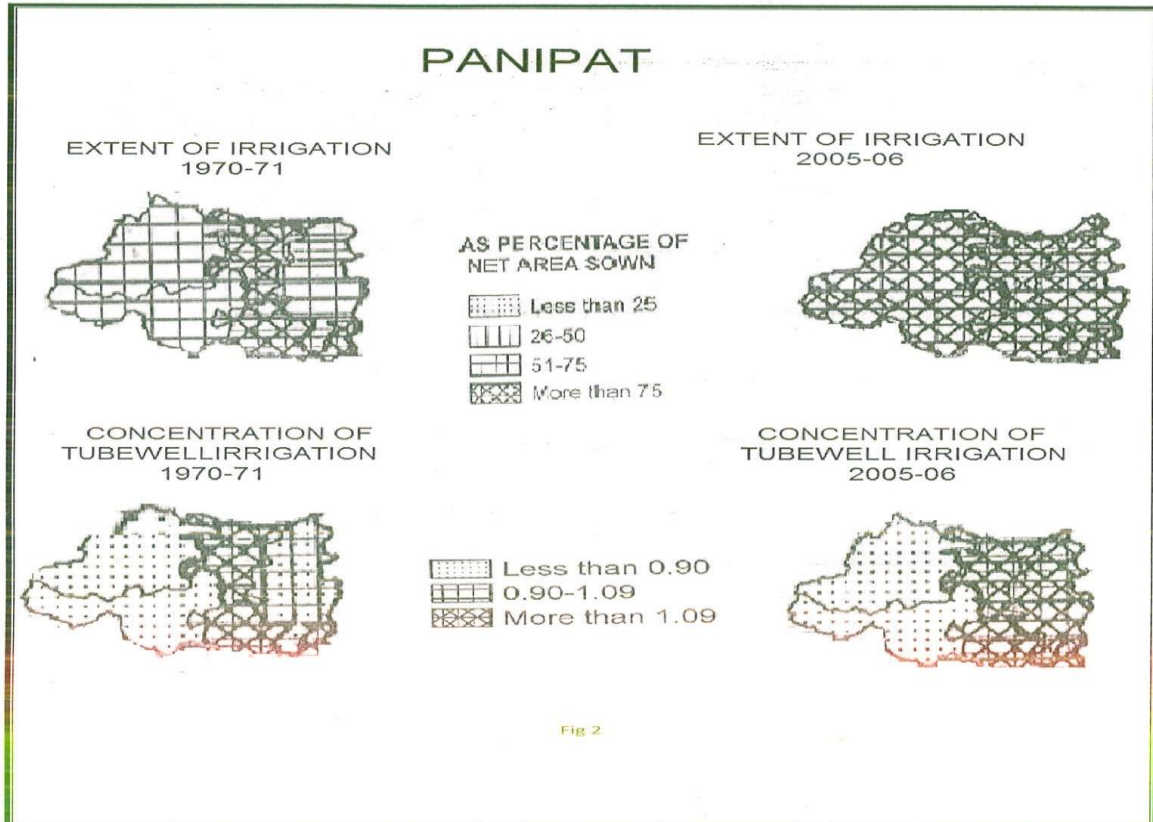
BLOCK	2005-06
Panipat	26.14
Madlauda	23.32
Israna	23.38
Samalkha	19.74
Bapoli	26.43

Source: Director of Agriculture, (2005-06) Haryana

Concentration of Tubewell Irrigation

When the proportion of any characteristics in an area is studied in relation to its proportion in the region, the ratio used in the location Quotient/ concentration. The higher and lower value of the Location Quotient shows the concentration and dispersion of the tube wells in the study area. In 1970-71 there was lower concentration of tube well irrigation in Madlauda and Israna blocks (location quotient less than 0.90). Bapoli block had balanced concentration of tube well irrigation. Panipat and Samalkha blocks had higher concentration of tube well irrigation (location quotient more than 1.09). But in 2005 -06 Israna, and Madlauda have lower concentration of tube well irrigation due to surface use of water from Western Yamuna

Canal and its distributaries. Panipat, Bapoli and Samalkha blocks had higher concentration of tube well irrigation (Fig 2).



Intensity of Irrigation

The intensity of irrigation in the study area increased 68 percent to 97.87 percent in the district during the study period. The minimum intensity of irrigation was 52.34 per cent (Madlauda) and maximum was 86.29 percent (Samalkha) in 1970-71. In 2005-06 maximum intensity of irrigation was 99.89 per cent (Panipat) reached up to 100 percent (table 5). This enhancement is due improved irrigation infrastructure.

TABLE 5 INTENSITY OF IRRIGATION

Blocks	1970-71	2005-06
Panipat	79.67	99.89
Madlauda	52.34	98.49
Israna	61.09	98.43
Samalkha	86.29	97.42
Bapoli	60.61	95.2

Cropping Pattern during 1970-71

In Panipat district wheat, rice, fodder, sugarcane and maize were major crops along with minor crops like pulses, cotton, barley, orchards, potatoes, oilseed, wheat + chana, dhancha etc. In block with more than 88 per cent share of arable land. In Madlauda block Wheat, rice and fodder were leading crops with more than 94 per cent of total cropped area. In Israna block wheat, rice, fodder and sugarcane were prominent crops .The share of these crops were Panipat block of Panipat district Wheat, rice, fodder and maize were prominent crops in Panipat more than 97 per cent of total cropped area. In Samalkha block Wheat, sugarcane, rice and fodder were prominent crops with more than 86 per cent of arable land. In Bapoli block wheat, rice, sugarcane and fodder were major crops with more than 91 per cent share of arable land.

Cropping pattern during 2005 – 2006

In Panipat district wheat, rice, fodder, sugarcane were major crops along with minor crops like pulses, cotton, jo, orchards, potatoes, oilseed, dhancha etc. In Panipat block wheat, rice and fodder were prominent crops along with 94 per cent share of arable land. In Madlauda block rice, wheat and fodder were leading crops. The share of these crops were more than 99 per cent of total cropped area. In Israna block wheat, rice, fodder and sugarcane were the dominant crop with 98 per cent share of total cropped area. In Samalkha block Sugarcane, wheat, rice and fodder were prominent. The share of these crops were more than 92 per cent of total cropped area. In Bapoli block rice, wheat, sugarcane and fodder were the prominent crops with more than 93 per cent of share of arable land.

Intensity of Cropping

Blocks	1970-71	2005-06
Panipat	151.22	188.4
Madlauda	167.66	185.05
Israna	126.3	193.12
Samalkha	156.72	174.04
Bapoli	151.92	196.25

The intensity of cropping refers to the number of crops grown on the agricultural field during an agricultural year. The intensity of cropping of the study region had increased from 150.76 to 187.37 per cent in 1970-71 and 2005-06 respectively. The maximum intensity of cropping was 167.66 per cent (Madlauda) in 1970-71 and 196.25 per cent (Bapoli) in 2005-06 (table 5) This enhancement was due to tubewell irrigation.

Crop Cobinationm

Crop combination is a procedure to vary the boundaries of agriculture region based on the statistical comparison of hectares of different crops.

In 1970-71 there was two crop and three crop combination was common. Two crop combination wheat-rice had observed in Madlauda and Israna blocks. Three crop combination wheat-rice-fodder combination was common in Panipat block. Wheat-sugarcane-rice combination was common in Samalkha and wheat-rice-sugarcane combination was found Bapoli.

In 2005-06 mainly two categories of crop combination was famous. One was rice-wheat crop combination in Madlauda block and wheat-rice crop combination in Panipat and Israna blocks. Second, Rice-wheat-sugarcane combinations was common in Bapoli block. Sugarcane-wheat-rice combinations was found in Samalkha block .

Conclusion

The main stress has been on tube well irrigation, which irrigates most of the cultivated area in the

study region. The intensity of tube well irrigation has increased manifolds and come closer to 100 per cent in the study area. In study area the density of tube wells increases at a very fast rate. Due to the tube well irrigation cropping pattern has been changed in the study area. Emphasis has shifted from coarse food grain to fine food grain and cash crops sugarcane. Coarse food grain require less amount of water. Whereas cash crop i.e. sugarcane and fine food grain like rice and wheat are water demanding crops.

Intensity of cropping increased in the study area due to the use of HYV seeds, insecticides, pesticides, irrigation facilities and modern methods of agriculture. Bapoli has very high intensity of cropping more than 196 per cent. In both the study period two and three category crop combination had been seen.

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