

Agricultural perspectives and its impact on soil and groundwater

A Case study of Bibipur Village, Yamunanagar, Haryana

Daljit Kaur Sandhu and Ms. Krishna Kaushik, Yamunanagar, Haryana

Abstract

Over the last 20 years, major changes have occurred in agricultural activities - cropping patterns, crop combination and land use in Bibipur village of Yamunanagar district. Due to expansion of ply board industries in the region the area under wheat and rice has been replaced by new crop named Poplar (tree). The crop combination of the village i.e. sugarcane-wheat-rice in 1990-1992 has been replaced by sugarcane-wheat-poplar in 2010-2012. Increasing cropping intensity has experienced a change in accordance with decline in waterlogged area. In fact, sugarcane is water demanding crop but the groundwater has not depleted due to the location of village along Yamuna River. In this village shallow water is not suitable for drinking purpose from last few years due to the excess use of chemical fertilizers and insecticides in the agricultural field and the leaching of contaminated water of Yamunanagar city and industrial waste in Yamuna River. In shallow ground water conductivity and TDS is high and turbidity and DO is low from the normal values. The village has sandy and silty loam soil with low organic carbon, phosphorus, sulphur and medium potash contents.

Key Words: *Crop pattern, crop combination, crop intensity, soil, ground water.*

Introduction

Bibipur village is located at 30°7'30" north latitude and 77°23'16" east longitudes with an area of 255 hectares in Jagadhari block of Yamunanagar district in Haryana. It is approximately 10 kilometers from Jagadhari towards east. Bibipur village is dominated by Muslim population.

Agricultural development is an interlinked process of agro climatic condition, implementation of modern inputs in farming related to high yielding varieties of seeds, chemical fertilizers, insecticides, herbicides, pesticides and irrigation. The scope for expanding the net sown area having already reached a saturation level

in study area and the potential for raising the yield nearly exhausted in many crops and regions, stepping up of the incidence of multiple cropping will be necessary to augment agricultural production (Hayami et al, 1971). Both human and environmental factors contributed to the intensification process and changing cropping patterns remain central to it (Ali, 1987). Expansion of new crops will change the existing cropping patterns and increase total agricultural output although productivity per agricultural worker may tend to decline as more and more family labourers would engage in farming (Brush and Turner, 1987; Grigg 1982).

Objectives

1. To examine the change in land use and cropping pattern in the village since 1990-1992 and 2010-2012.
2. To analyze the spatial pattern of crop combination in 1990-1992 and 2010-2012 in Kharif and Rabi season.
3. To study the physical and chemical properties of the soil in Bibipur village in Yamunanagar district.
4. To analyze the quality and depth of ground water (shallow and deep water) of Bibipur village in Yamunanagar district.

Data Base and Methodology

The study is based on primary and secondary data. The secondary data has been taken from khasra girdawari 1990 -1992 and 2010 – 2012. The primary data is collected by personal contact with the farmers. Soil test result has been taken from soil testing lab of Agriculture Department, Yamunanagar.

The results of Groundwater qualities (pH, Conductivity, TDS (Total Dissolve Solution), Turbidity and D.O (Dissolve Oxygen) are self-tested by the researcher in the college department lab with the help of Deluxe Water and Soil Analysis Kit Model 172. Doi's technique is used for crop combination.

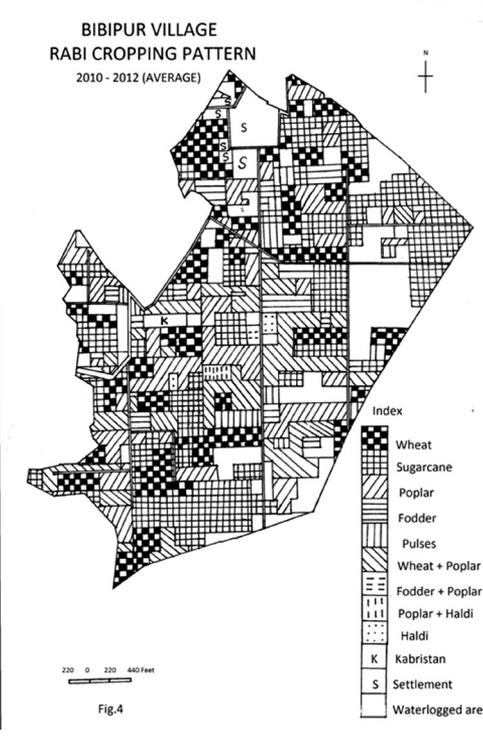
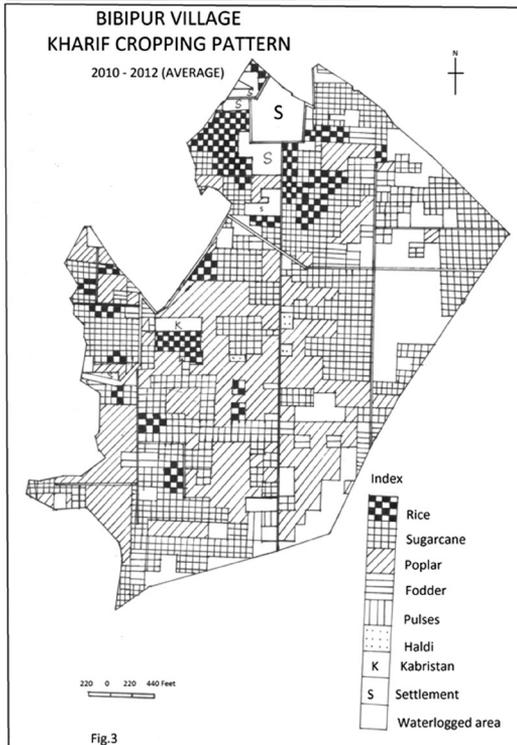
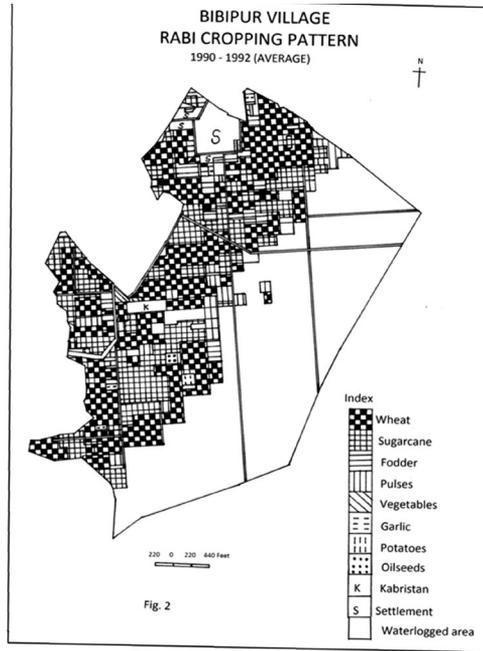
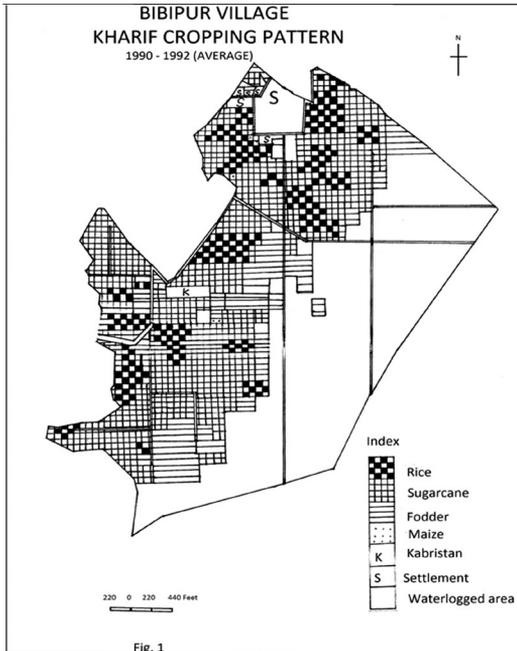
Land use of Bibipur village

Spatial pattern of land use in Bibipur village, net sown area since 1990-1992 to 2010-2012 has been increased by 24 per cent by declining water logged area in the study area. The waterlogged area has decreased by 25.06 per cent over the period of 1990-1992 to 2010-2012. Area sown more than once has increased by 31 hectares from 1990-1992 to 2010-2012. Land not available for cultivation is also increased by 15.03 per cent during 1990-1992 to 2010- 2012. Fallow land has enhanced by 0.39 per cent since 1990-1992 to 2010-2012.

Table 1.1 LandUse of Study Area(Hectares) 1990- 1992and 2010-2012

(Percentages are given in bracket)

Years	Geographical Area	Land not available for cultivation	Water Logged area	Fallow land	Net sown area	Area sown more than Once	Total cropped area
1990-1992	255	78 (30.58)	84 (32.9)	0.5 (0.19)	92.5 (36.27)	79	171.5
2010-2012	255	117 (45.88)	20 (7.84)	1.5 (0.58)	116.5 (45.68)	110	226.5



Changing Cropping pattern and crop-combination during 1990 – 1992

Sugarcane-wheat-Rice was crop combination designated in the study area by Doi's techniques. Sugarcane was main crop in 1990-1992 and covered 41.54 percentage of the total cropped area in 1990-1992 (Table no 1.2). Wheat was next highest crop in 1990-1992 and covered 28.12 percentage of total cropped area, and followed by rice in 1990-1992 (16.72 percent). Next it was fodder crop. Pulses, vegetable (methi), oilseeds, garlic and potatoes were the other minor crops and covered the 13.62 percentage of the total arable land (fig.1 and 2).

Changing Cropping pattern and crop-combination during 2010 – 2012

In 2010- 12 three crop combination i.e. sugarcane-wheat- poplar is designated in the study area. Rice crop is replaced by poplar trees. Sugarcane is major dominant crop and covered 48.63 percentage of the area (Table No 1.2). The area under Wheat crop decreased from 28.12 to 18.84 per cent in 1990-1992 to 2010-2012 respectively. In 2010-2012 the area under rice crop has decreased by 10.8 per cent and it is not included in crop combination. Therefore, in 2010-2012 poplar trees is considered as a dominant crop and covered 15.50 per cent of the total cropped area, it is also grown with the combination of wheat - poplar, haldi-poplar and fodder- poplar. Pulses, garlic, oilseeds are the other minor crops. These crops cover 1.36 per cent of the area. An arable land increased by 9.41 per cent in 2010-2012 from 1990-1992. (fig.3 and 4).

Cropping Intensity

Cropping intensity of the study area has been increased by 185.40 to 194.42 per cent from 1990-1992 to 2010-2012 respectively. It is increased by 9.02 per cent. It is due to increasing in the cultivated land and declining in the waterlogged area in the study area. Single cropped area was 34.97 in 1990-1992 and double cropped area is 64.83 per cent per cent in 2010 - 2012 (fig. 5). There is decrease in single cropped area by 1.16 per cent in 2010-2012 and double cropped area is increased by 0.91 per cent in 2010-2012 (fig 6).

Results of soil and Ground water

In the study area pH and EC are (Normal), OC, Sulphur and Phosphorous are (Low) and Potash is medium in soil. The results of deep ground water have been recorded that is pH 7.89 pH (normal), conductivity 0.49 mS (0.8 mS normal), TDS (Total dissolved solvent) 0.31ppt (0.20ppt normal), turbidity zero ntu (0 -2 ntu normal) and DO (Dissolve oxygen) 5 ppm (5-8 ppm normal). In the ground wa ter TDS is high. The deep water is fine for drinking and agricultural purposes. The results of shallow ground water have been recorded i.e. pH 7.21 conductivity 1.16 mS, TDS 0.74 ppt, turbidity zero ntu and DO 4.8ppm. Only pH is normal in shallow water, conductivity and TDS are high, DO low and turbidity is normal. Thus the shallow water is not good for drinking. It is usable for irrigation and washing purposes.

Table 1.2 Cropland occupancy as percentage of Total Cropped Area

Crops	1990-1992	2010-2012	Change from 1990-1992 to 2010-2012
<u>Kharif</u>			
Rice	16.72	5.92	-10.8
Sugarcane	41.54	48.63	+7.09
Fodder	8.08	4.10	-3.98
Haldi	--	0.30	+0.30
Poplar	--	8.21	+8.21
<u>Rabi</u>			
Wheat	28.12	18.84	-9.28
Wheat- Poplar	--	2.9	+2.9
Pulses	1.83	0.91	-0.92
Fodder	2.20	2.43	+0.23
Potato	0.18	--	-0.18
Haldi	--	0.31	+0.31
Vegetables	0.55	--	-0.55
Oilseeds	0.39	0.15	-0.24
Garlic	0.39	--	-0.39
Poplar	--	7.3	+7.3
Volume of change in cropping pattern	100	100	± 26.34

Table 1.3 Distribution of Land Holding Size

Size of Holdings (Acres)	Percentage
Marginal size of holding Below 2.5	57.14
Small size of holding 2.5– 5.00	33.33
Medium size of holding 5.00– 15.00	9.52
Large size of holding More than 15.00	Nil

Land size

In sample village 57.14 per cent area is cultivated by marginal farmers, 33.33 per cent by small farmers and 9.52 per cent area is cultivated by medium farmers. Large size of holding is absent in the study area (table 1.3).

Cropping pattern according to size of holding

In marginal size of holding, farmers have sown all type of crops rather than in small and medium size of holding (Table 1.4). Pulses is absent in small and medium size of holding.

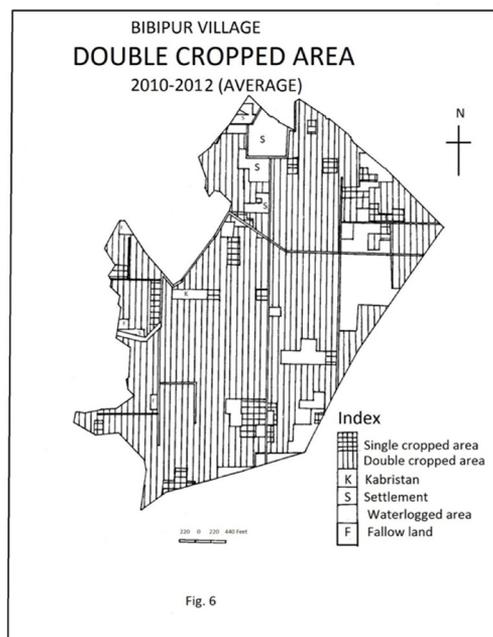
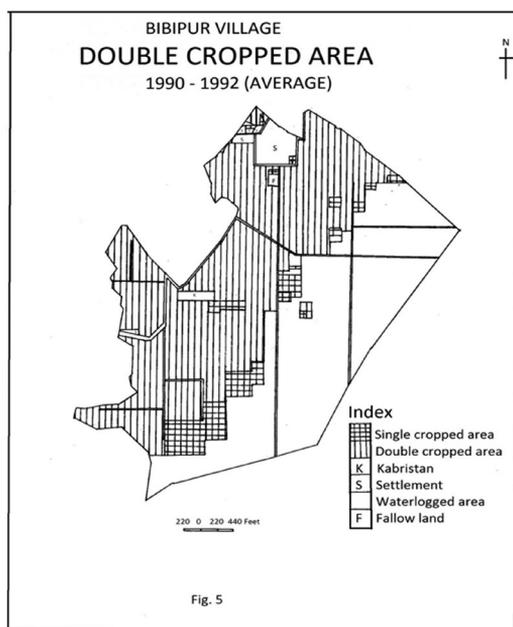


Table 1.4 Distribution of crops in Different size of Holding

Crops	Marginal size of holding	Small size of holding	Medium size of holding
Sugarcane	19.64	21.62	20
Wheat	26.78	21.62	20
Rice	26.78	18.91	20
Fodder	14.28	18.91	20
Pulses	1.78	--	--
Poplar	10.71	18.91	20

Values in percentage

Conclusion

Over the last 20 years, major changes have occurred in agricultural activities - cropping patterns, crop combination and land use in Bibipur village in Yamunanagar district. Expansion of new crop (poplar tree) has changed the existing cropping pattern. Poplar trees are also grown with the combination of rabi crops. Due to its eco-friendly nature with other crops, they shelter

their leaves in winter season as a result rabi crops (wheat etc.) will receive good sunshine for the growth of plants. The soil will also get enriched by the decomposition of the leaves. Poplar trees will help in storing the irrigated water due to the spreading of fallen leaves on the agricultural field. Moreover, poplar trees will mature within 4-5 years. The wood of poplar will be ready for plyboard industries in the region. Farmers attain more profit and

feel comfort with the cultivation of poplar trees. Cropping intensity has increased. Single cropped area has decreased whereas double cropped area has increased therefore multiple cropping system is popular in the village. Net cropped area has increased steadily with the corresponding decline in waterlogged area.

Reference

- Ali, Abu Muhammad Shajaat (2002): “An Ecological Explanation of Recent Changes in Cropping Patterns in Bangladesh”, National Geographical Journal of India, Vol. 48, pp.77-90.
- Basu, Swapna (1984): “Impact of D. V. C. Irrigation in Changing the Landuse and Cropping Pattern of the Lower Damoder Valley”, Geographical Review of India, Vol.46, No. 1, pp.70 – 78.
- Carlyle, William J (2002): “Cropping patterns in the Canadian Prairies: thirty years of change”, The Geographical Journal, Vol. 168, No. 2, pp. 97 – 115.
- De Lisle, D. de G. (1982) : “ Effects of Distance on Cropping Patterns Internal to the Farm”, Annals of the association of American Geographers, Vol. 72, No. 1, pp. 88- 98.
- Jana, M.M. (1987): “Cropping Patterns in West Bengal”, Geographical Review of India, Vol.49, No. 3, pp.13 – 22.
- Sharma, T.C. (1997): “Trend in Cropping Intensity in Karnataka: A Regional Profile”, Transactions of the Institute of Indian Geographers, Vol.19, No. 1, pp.17 -30.
- Singh, Jasbir and Dhillon, S. S. (2004): “Agricultural Geography”, Tata McGraw – Hill Publishing Company Limited, New Delhi.
- Singh, Jasbir and Kaur, D. (1990) : “Fluctuations in ground water table and its impact on crop intensity/ cropping pattern in Jagadhri Tehsil (Ambala District)”, Unpublished M.Phil.. Dissertation.
- Sharma, Vijay Kumar and Kaur, D. (2007): “Groundwater and Agricultural Development in North Eastern Haryana (1970 – 2003)”, Unpublished Ph.D. thesis.

Dr. Daljit Kaur Sandhu
(Associate professor)

Ms. Krishna Kaushik
(Research fellow)
Guru Nanak Khalsa College,
Yamunanagar, Haryana

