INTRODUCTION

It is a fact that even after more than forty years of independence and planned development with special emphasis on agricultural development, achieving and sustaining self sufficiency in food production remains our primary concern. One explanation for our impasse is our increasing population. We are adding, each year, something like the population of Australia to our numbers. We will be one billion by the turn of the century and over 1.5 billion by the time our population gets stabilized. What these facts convey is that in the future we will need to produce more and more from a progressively diminishing natural base. The cultivated area of the country remained nearly constant at 140 million hectares over the past two decades. The net per capita availability of cultivated land which was more than 0.3 hectares in the 1950s will stand reduced to less than 0.14 hectares by the turn of the century.

Even at moderate levels of foodgrain consumption we will need 235 million tonnes of foodgrain by the year 2000. Between the decade 1980-81 and 1990-91, the foodgrain production increased by about 40 million tonnes. Over the next ten years period we will need to increase production by about 65 million tonnes. In the fifties and sixties, extension in the cultivated area contributed substantially to increase in foodgrain production. But in future, there appears no scope, whatsoever, to expand the area under cultivation. Keeping this fact in mind
the government introduced high yielding varieties of rice, wheat and other crops in relatively well endowed areas which brought green revolution in the country. It was during this period that a large number of state agricultural universities were established which provided a strong research base for generating and spreading technologies.

Since green revolution which is mainly associated with the discovery of the high yielding varieties of rice and wheat, each and every farmer knows the potentialities of those modern inputs. It is seen from the present work that the development of Indian agriculture depends upon the technological change- a change in the parameter of production function resulting directly from the use of knowledge.

The use of technology in agriculture is geared to serve immediate and long term purposes. In the long term purpose, the full employment at progressively rising levels of income is provided for the population which is engaged in agriculture practices.

The institutional factors have their own importance. These factors are highly responsible for the development of agricultural production. A single word 'land reform' is used to increase the productive efficiency of land.

In view of the importance of technological and institutional factors, the author in the present work has tried to assess the role of these factors in the agricultural
development in Western Uttar Pradesh since 1950. Western Uttar Pradesh has been selected as the study area because this region basically is an area where agriculture is the predominant occupation of the people engaging directly or indirectly of about 70 per cent of the total population.

The main objectives of the study are:
1. To take into account the physical base of the region which provides basic framework for the practice of agriculture.
2. To study the spread and diffusion of technological and institutional factors in the region.
3. To assess and analyse the trend in area, production and yield of major crops of the region.
4. To examine the spatio-temporal development of agriculture with special reference to crop productivity in the study area.
5. To study correlation between technology and agricultural development in the region.
6. To examine the levels of agricultural development of the study area.
7. To suggest suitable guidelines for future development of agriculture in Western Uttar Pradesh.

Western Uttar Pradesh, the study area is the most developed and prosperous region of the state of Uttar Pradesh but the intra-district imbalances can be seen. The backward areas lack adequate infra-structure. Because the variations in
the levels of the development in various districts are accompanied by equally sharp variations in infra-structure facilities. The region is the center of agricultural activities from the very beginning because of its fertile soil, level topography and suitable climatic conditions. About 75 per cent of the region's area and 70 per cent of its population is engaged in agriculture. Due to greater pressure of population per household and per capita land averages are very low. This had led to fragmentation of holdings which with a greater rate of illiteracy does not provide all the year round employment to the rural masses. If the economy of the masses has to be improved, it is imperative that agricultural production should increase at a faster rate.

The region occupies the fertile north-western portion of the upper Ganga Plain which is well endowed with water resources and good climatic conditions which have favoured agricultural development. The total cultivated area of the region was 5,746,781 hectares and the total agricultural production was 49,405,583 metric tonnes in 1990-91. According to the census of India 1990-91, the total population of the region was 36,502,598 persons.

Western Uttar Pradesh lies approximately between 26° 20' N to 29° 45' N latitudes and 77° E to 80° E longitudes comprising the districts of Muzaffarnagar, Meerut, Ghaziabad, Bulandshahr, Aligarh, Mathura, Agra, Etah, Mainpuri, Moradabad,
Budaun, Shahjahanpur, Farrukhabad and Etawah. The districts of Muzaffarnagar, Meerut, Ghaziabad and Bulandshahr occupies the Upper Ganga-Yamuna doab, the districts of Aligarh, Mathura, Agra, Etah, Mainpuri, Etawah and Farrukhabad occupies the Central Ganga-Yamuna doab while the districts of Moradabad, Budaun and Shahjahanpur lies outside the doab in the Rohilkhand plains. It forms part of the Indo-Ganga Plain which lies between northern peninsular and the recently built Himalayan Chain and is one of the most important plains in the world. The level surface of the plain commanded and traversed by the glacial fed perennial rivers of the Himalaya, offers every facility for the construction of great canals.

The region has a well developed drainage system which plays a dominant role for the development of agriculture. The Ganga, Yamuna and Ramganga and their tributaries are the three main systems of the drainage of the study region. This region has no marked surface irregularity. The underground aquifers are supplemented from the rain water which sinks easily into the ground. The percolation from major rivers, their tributaries, canal field channels, ponds and tanks also contribute to maintain ground water level.

The study region is a sub-humid area between the dry Punjab plain and the humid eastern plain of Uttar Pradesh within the vast monsoonal regime of the great plain. The year is divided into a cold winter season, a hot weather season
and a season of general rains. The agriculture follows its own calendar with two years of Kharif from June to October and rabi season from November to April.

The soils of Western Uttar Pradesh are of alluvial origin, geologically grouped as Khader, bhangar and tarai varieties. The soils of the study region are so uniform and similar in their characteristics that it is often difficult to differentiate the soil of one region from the other.

For better understanding, the whole work is divided into three parts. First part deals with the physical setting of Western Uttar Pradesh and also includes a review of literature to become fully acquainted with the environmental setup of the study area and with the work done so far and the problems involved in this area. This part consists of four chapters. The first chapter deals with the structure and relief of the region, chapter second highlights the drainage system of Western Uttar Pradesh and chapter third highlights the climate and the soil of the study area. Chapter forth deals with review of literature on agricultural development and the factors which are responsible for the development of agriculture.

The second part of the thesis is an analytical study involving five chapters. The spread and diffusion of technological and institutional factors in Western Uttar Pradesh is dealt within the fifth chapter. Here, all the major technological and institutional factors which are responsible
for the development of agriculture in the study region are
considered and their spread and diffusion on every tenth year
from 1950-51 to 1990-91 is assessed. The factors which are
considered in this chapter are irrigation which is the surest
way for increasing the agricultural productivity, high yielding
varieties of seeds which can increase the agricultural
productivity very much if the chemical fertilizers and well
irrigation facilities are provided, fertilizers which play a
catalyst role in the development of agriculture, by replacing
the age old agricultural impliments and machineries such as
tractors, pumping sets and harvestors can increase the
production of foodgrains, cooperative banks, land holdings and
literacy.

Chapter sixth deals with the districtwise area,
production and yield (productivity) of major agricultural crops
grown in Western Uttar Pradesh. In this chapter all the major
crops have been selected and analysed under four groups of
cereals, pulses, cash crops and oilseeds from 1950-51 to 1990-
91.

The author has examined the spatio-temporal
development of agriculture in Western Uttar Pradesh with special
reference to crop productivity is dealt in chapter seventh. The
productivity indices have been calculated on the basis of Yang's
yield formula for the two periods of time, i.e. 1950-51 and
1990-91, considering all the major agricultural crops grown in
the study area.
Chapter eight deals with the modern technology and agricultural development in Western Uttar Pradesh. In this chapter, the researcher has tried to assess the role of technological and institutional factors in the study area. Firstly, an attempt has been made to determine the inter-relationship among the independent variables during the periods of 1970-71 and 1990-91 and secondly, the precise role of various indicators of agricultural development is determined through factor analysis.

The researcher has examined in the ninth chapter the levels of agricultural development and has assessed how far it is influenced the change in the magnitude of technological and institutional variables. The chapter is divided into three parts. The first part deals with the change in cultivated area and its correlation with the change in technological and institutional variables. The second part is devoted to explain the change in agricultural production and the extent of the influence of change in selected variables and the third part deals with the change in agricultural productivity and its correlation with the change in selected variables.

Finally, the third part of the thesis is devoted to the summary. In the chapter tenth the researcher has suggested measures to be undertaken in order to overcome the problem of hungers by proper agricultural development of the area.