INTRODUCTION
Agriculture occupies a place of pride in India's national economy. It contributes around 32 per cent to the national income. It has a share of 30 per cent in the gross domestic product (GDP) of the country and accounts for about 18 per cent to the total value of the country's exports. Agriculture is a source of livelihood for over 70 per cent of the population and provides fodder to the cattle and raw material to agro-based industries. Its importance may be judged from the fact that any economic developments of the states or region of the country is possible only if efforts are made to develop agriculture. Agricultural output in India determines not only the per capita income of farm sector but also influences the standard of living of rural population and the nutritional standard of the poor masses.

It is evident that agriculture occupies a dominant position in the national economy, but the sad part is that its production efficiency is not upto the mark if compared with other agriculturally advanced countries of the world. Its yield of crops in India is comparatively low, which is about 0.33 or 0.25 per cent of the yield of such countries. The low yield per hectare in the country is mainly due to improper cultivation of land and less use of modern agricultural inputs. The existing situation requires immediate attention of geographers, planners, economists and agricultural scientists to study the problems and suggest measures for enhancing output. One way out may be to conduct field to field surveys of agricultural areas to ascertain the local needs and satisfy them accordingly. Increase in per hectare crop yields and total production, can be achieved mainly through practicing multiple cropping, adopting high
yielding varieties of seeds and through rational use of land resources. Efforts are continuously being made in this direction and considerable improvement has been achieved in agriculture during the last four decades. With the onset of green revolution in the mid 1960's, there has been rapid increase in agricultural production in India as a result of diffusion of technological innovations and use of institutional resources i.e. package of improved cultural practices involving high yielding varieties of seeds, use of fertilizers, irrigation, application of pesticides and insecticides and farm mechanization. It is believed that new technology has generated more income and employment to the rural mass, but the benefits are not evenly distributed among the different regions and group of people.

India has increased her production of foodgrains particularly of cereals, like wheat, rice and maize, presently the country is not only self-sufficient in food grain production but has also stock of foodgrains for any emergency requirements.

Though country has become almost self-sufficient in foodgrains production, the planners and agricultural economists have in recent years expressed serious concern about the slow rate of growth in production of principal crops. The average growth rate of total foodgrains production during 1994-95 to 2000-2001 was a dismal 0.81 per cent. Rice production during the period grew at 1.11 per cent and wheat production rose by 2.24 per cent. During the same period millets recorded a growth rate of 0.02 per cent and pulses registered a negative growth rate of 1.55 per cent. This trend has to be reversed and the agricultural development in the country should be put on a faster track to meet the foodgrain demands of the
future. In order to catchup with other developing countries in agricultural production and emerge as a leader in farm production in the years to come, the country should draw up an innovative, farmer-friendly and implementable farm policy. The new policy should make agriculture economically rewarding and intellectually challenging to attract and retain the youth in this important avocation.

Keeping in view, the importance of technological and institutional factors, the author has selected "Uttarakhand" an area for detailed study, because this is agriculturally backward and need special attention. The economy of Uttarakhand is agriculture based and more than 80 per cent of its population is dependent upon this resource. Being a hilly area there is scarcity of agricultural land in Uttarakhand and the share of per capita cultivable land is very low. Uttarakhand is a natural unit bounded by Kali river in the east Tibet in the north, Himachal Pradesh in the west and fluvial Ganga plain in the south. In general the attitude of the region ranges from 1200 metres to more than 4800 metres. It is mainly drained by rivers Yamuna, Ganga, western Ramganga, and Kali or Sarda. These rivers generally take their origin in the snowfed mountains and are a perennial source of water for drinking, irrigation and power generation. Variation in altitude, topography, slope, and vegetation have resulted a varied climatic conditions in Uttarakhand. There is tropical climate at lower elevation. As one moves to upland upto 1800 metres, the climate becomes cool to cold temperate. Above 2400 metres in elevation, the climate is almost alpine to polar. Uttarakhand characterized by a rhythm of seasons, owing to reversal of winds during the south-west and north-east
monsoon. There are three main seasons in a year - i) The Hot-weather season (from March to mid-June), ii) The rainy season (from mid-June to October), iii) The cold weather season (from November to February). The rainy season is associated with the kharif crops while the cold weather is associated with the rabi crops. The hot weather season is generally dry and does not permit cultivation until the onset of the south-west monsoon. The monsoon results in heavy rainfall in the outer Himalaya. June with 35°C is the hottest month and January with 4°C is the coldest month of the year.

Nine soil groups namely podzolic, gray brow forest, bhabar, red sandy loam, mountain medow, tarai, skeltal and snow field have been identified in Uttarakhand. Depending upon ecological settings, soils too vary from slope to slope and valley to valley. Soils of Tarai-Bhabar, Duns and valleys differ much from those on slope and ridges. Soils of Uttarakhand in general are quite thin-layered, stoney and poor in fertility. Faced further with the problem of soil erosion and landslides due to heavy rainfall, the economic value of these soils is considerably less, except of course for cultivation of crops like potatoes and horticulture.

In consistence with the complexities of terrain and climate, the distribution of population (5.926 million in census year 1991) in Uttarakhand is highly uneven and sparse. More than 75 per cent population of Uttarakhand is concentrated in five districts of Nainital, Almora, Tehri-Garhwal, Pauri-Garhwal and Dehradun, which together constitute a little more than 2/5th of the total area. Population has greater concentration in the tarai-bhabar region and Duns, in valleys and on gently slopping and
sunny uplands. A major part of the Great Himalaya is uninhabited. The Uttarakhand as a whole has a very low density of population i.e. 133 person per square kilometre. Areas of higher density are those having good terrain, better climatic conditions, fertile soils, transport routes and facilities of water for various purposes.

**Objective of the Study**

The major objective of the present study are:

1. To analyse the importance of physical setting of the region which facilitates basic necessities for agricultural practices.

2. To analyse the landuse pattern, cropping intensity and the trends of growth in area, produciton and yield of major food crops of Uttarakhand.

3. To assess the spread and diffusion of technological and institutional factors in the study area.

4. To examine the spatio-temporal development of agriculture with reference to crop productivity in the study area.

5. To examine the impact of technological and institutional factors on the development of agriculture in Uttarakhand.

6. To measures the levels of agricultural development in the study area.

7. To suggest appropriate guidelines for future development of agriculture in Uttarakhand.
Database and Methodology

The present study is carried out for the period from 1979-80 to 1994-95; based on secondary sources of data, obtained from Directorate of Agriculture Statistics & Crop Insurance and State Planning Institute, Lucknow and District Statistical Handbook. The following techniques have been used by the author for the analysis of present work:

i) The physical setting of Uttarakhand has been described in detail.

ii) To examine the trends of agricultural development, trend lines have been plotted with the help of regression equation $Y = a + bX$, regression lines make it possible to show the exact change in area and production of different crops.

iii) To assess the development of agriculture by the diffusion of technological and institutional factors, per thousand hectares of cultivated land has been opted for the analysis of agricultural mechanization i.e. tractors, pumpsets, wooden plough and iron plough. Besides, consumption of fertilizers (kg per hectare), irrigation, agricultural credit societies, agricultural workers, literacy and land holdings are taken into account.

iv) The indices of crop productivity, have been calculated on the basis of Yang’s yield index method for two periods 1979-80 and 1994-95.

v) The role of technological institutional factors in the development of agriculture has been examined with the help of correlation analysis, factor analysis and composite mean Z-score statistical technique.
Plan of the Work

For better assessment, the present work is divided into six chapters, which are as follows:

Chapter First deals with physical factors like relief, geology, drainage system, climate, soil and natural vegetation of Uttarakhand.

Chapter second presents the concept of agricultural development and highlights theoretical aspects of technological and institutional factors relating to agriculture.

Chapter third describes the trends of agricultural development with special reference to landuse pattern cropping intensity, growth rate of area, production and yield of major food crops and their irrigated area for four period i.e. 1979-80, 1984-85, 1989-90 and 1994-95.

Chapter four describes the spatial distribution of technological and institutional factors in Uttarakhand.

Chapter five is devoted to spatio-temporal development of agriculture with reference to agricultural productivity.

Chapter six focusses the patterns of agriculture development and technological and institutional factors in the study region. The technological and institutional factors in the study region have been assessed in three ways. Firstly, an attempt has been made to determine the inter-relationship among independent variables through correlation analysis for the period 1979-80 and 1994-95, secondly, the precise role of various indicators of agricultural
development through Factor analysis. Thirdly, it examines the levels of agricultural development through composite mean Z-score technique.

At last author has incorporated summary and many more suggestions regarding the development of agriculture in Uttarakhand.