PART- I
1.1 The Problem

Agricultural development is multifaceted in nature. It is the outcome of a number of variables, which are physical, social, economic, and technological in nature. It involves a variety of aspects like agricultural land-use, intensity of cropping, crop productivity, innovation in agriculture, crop diversification, commercialization of agriculture, nature of agrarian interrelationship, maintaining the balance between environment and agriculture and so on. There are distinct variations in the magnitude and importance of these aspects both over space and time.

A scientific investigation and evaluation of different aspects of development both over space and through time is highly necessary in order to have a clear picture of the nature of agricultural growth and development. Keeping these facts in view the Sonitpur district of Assam has been selected as the study region, which exhibits spatial disparity in the level of agricultural development.

The Sonitpur district located in the central North bank plain of the Brahmaputra valley, Assam with three sub divisions and seven revenue circles is essentially a region based on agrarian economy. Its areal extent is from 26°30' N to 27°01'N latitude and from 92°16' E to 93°43'E longitude. The district covering a total geographical area of 5324 square km with a population of 1681514 persons (2001), accounting for 6.78% of the total geographical area and 6.80% of the total population of the state respectively. The region exhibits a diverse agricultural land-scape with its multi-ethnic population structure. The proportion of the workforce engaged in agricultural activities is 46.68% according to 2001 census.
LOCATION OF STUDY AREA
(SONITPUR DISTRICT)

Fig.: 1.1

LOCATION OF STUDY AREA
(SONITPUR DISTRICT)

Fig.: 1.1
Two types of farming have been in practice in the district viz. peasant farming, which is self subsistence in nature and mainly devoted to cultivation of food grains, pulses, oilseeds, jute, fruits, vegetables and spices etc., and plantation farming mainly tea plantation, which is well organized capitalist farming. In this study especial emphasis is given on peasant farming of the district.

The agricultural development of the district Sonitpur is lagging behind as compared to some other districts of Assam. Constantly growing pressure of farming community over the arable land, insufficient irrigation facilities, lack of mechanization etc are some problems of agricultural development in the district. In spite of such draw backs, there occurs some spectacular changes in agricultural sector of the district like participation of unemployed youths in plantation and commercial agriculture, introduction of new crops, extension of agricultural activities to wet lands and reverine tracts etc. and so on. Nevertheless development of agriculture achieved so far is not evenly distributed over space and through time, rather there is marked spatio-temporal variation in agricultural development of the district. Considering the different innovative practices in agriculture and variations in agricultural development, the present study has been undertaken in order to examine the spatial and temporal variations in agricultural development and the causes related to it. This study is likely to help in proper agricultural planning for the future socio-economic development in the district.
1.2 Objectives
The principal objectives of this study are -

i) to find out the basic factors of agricultural development in the district viz., physical, socio-economic and technological

ii) to analyze the various innovative practices like, use of irrigation, fertilizer, HYV of seeds, mechanization, as well as intensification in agriculture etc.

iii) to assess the contribution of various social groups to the agricultural changes in the region and examine the controlling factors behind such changes.

iv) to analyze the pattern of agricultural development in Sonitpur district in spatial and temporal dimensions, and

v) to suggest measures for effective agricultural development in order to eliminate intra-regional disparity in agricultural development in the district.

1.3 Research questions

i) Is the agricultural development more in active flood plain zone dominated by Muslim peasants of immigrant origin than the foothills and built-up areas mainly dominated by indigenous population including tribals?

ii) Is small size of operational holding the main constraint that inhibits acceptance of innovative practices by the farmers?

iii) Is intensity of cropping related to pressure of rural population on agrarian land?

iv) Does the productivity (Yield per hectare) vary in different spatial units?

If so, is it related to use of HYV of seeds or to area under irrigation or transportation and market disadvantages?

v) Are there introduction of new commercial crops by educated unemployed youths in the built-up areas of the district?

vii) Is there any role of market economy on the cropping pattern?
1.4 Database and Methodology

In the study, the base map wherein the revenue circles of the district are considered as spatial unit of investigation is prepared with the help of cadastral map prepared by Revenue Dept., Govt. of Assam, and the satellite map prepared by Assam Remote Sensing Application Centre, Guwahati (ARSAC). The secondary data and information collected from various sources like Census of India, Directorate of Economics & Statistics, Assam, Department of Agriculture, Assam, Revenue Dept. Assam, District Information Centre (DIC), Sonitpur, seven circle offices of Sonitpur district, and in certain cases from the records of DRDA, Community Development Blocks, Gram panchayat Office and Mouzaders. All such secondary data and information are made used mainly to derive spatial and temporal changes over various forms of analysis and also for comparative study in certain cases.

The required primary data and information for the work are collected through sample survey in 28 sample villages. The samples are selected at random with certain qualitative stratification. The selective qualities of samples are based particularly on ethnic character, though the samples are distributed in all the seven revenue circles of the district. The primary data are collected by using a household survey questionnaire (Appendix-I) from these 28 sample villages and in each of the sample villages 10% of the household (Appendix II) has been considered for primary survey. All such data and information are processed, compiled, analysed, compared and also reproduced in form of tables, maps charts, graphs, diagrams and other carto-statistical representation.
SONITPUR DISTRICT

LOCATION OF SAMPLE VILLAGES

INDEX
- - State Boundary
- - District Boundary
       Circle Boundary
       Forest Belt

Fig.: 1.2
1.5 Review of Relevant Literature

The development of agricultural geography as a distinct branch of the discipline dealing with most fundamental and widespread occupation is of very recent origin. Many studies like spatial distribution of crops and live-stock, their production and exchange etc. were done by some early geographers, but the development of agricultural geography in modern line has been emerging since early part of the 20th century. During the twenties and thirties of the last century the pioneering works produced by some of the most able geographers as Baker (1926-36); Jonasson(1925-26); Jones(1928-30); Von Valkenburg (1931-36)and Taylor(1930) made important contribution to the agricultural geography as a distinct branch of the parent discipline.

The renowned work of Whittlesey (1936) on agricultural regions of the world, where he attempted to classify the types of agricultural land-use over the world in terms of agricultural element complexes is considered to be significant to the subfield. During the late thirties and forties, the development in the branch was almost insignificant and no concrete work was added to the field. But in fifties there had been substantial improvement in the concepts and methodology of the field. One of the most important advancement made in this direction was that of by Weaver (1950), who tried to apply the “Least Deviation Model” for delineating crop combination regions. T.J. Coppock (1964) prepared the agricultural Atlas of England, Wales and Scotland, which is also highly significant in this regard. In 1964 Agricultural Typology was set up by International Geographical Union (IGU) to establish uniform criteria by which farms were classified and had persuaded the individual geographers to use these criteria in their works on different parts of the world. Grigg (1969) described the chief characteristics of the major agricultural systems of the world along with an elaboration how they came in to being. Symon (1970) in his work on
agricultural geography gave emphasis on influence of physical and social environment on agriculture as well as land use and land potential analysis. Side by side quantitative revolution of the fifties encouraged the development of positivistic approach in geography and gradually-hypothetic-deductive treatments of problems leading to model building and formulating theories by applying sophisticated statistical and cartographic techniques used to gain ground.

Prior to the fifties there was only regional description of major crops of the country. But during the decade of fifties there occurred significant changes both in content and methodology. Dayal (1950) analysed the various aspects of agriculture in Bihar and identified some agricultural regions. Mukerji’s (1957) works on importance of food crops, cash crops and land tenure system of the Meerut district and Banerjee’s (1954) works on influence of physical environment on distribution of tea gardens of west Bengal were some of the important contribution in the field of agricultural geography in India. During the later part of the 20th century many valuable contribution on agricultural geography appeared in different geographical journals of India. Misra (1972) studied the scope for increasing productivity in the arid lands and suggested improved methods of cultivation to be adopted in the arid zones of India.

Hussain (1970) studied how the distribution of rainfall determines the agricultural activities of upper Ganga-Yamuna Doab. Mohammad (1975) delimited the crop combination regions in Ganga-Tapti Doab. Safi (1972) criticized the earlier approaches to measure the agricultural productivity and presented a method for determining the productivity co-efficient of crops.

Pathak (1977) studied the role of crop association regions in agricultural regionalization in a case study of U.P. Himalayas. Singh and Chauhan (1977) applied
a composite index method to find out the agricultural productivity in Uttar Pradesh. Singh (1981) evolved a new technique for measurement of agricultural productivity in Haryana.

Singh and Dhillon (1982) in their book “Agricultural Geography” emphasized a number of aspects of the sub-discipline. Besides, the “Agricultural Geography” by Hussain (1979) has been widely accepted as precise book for higher level. In addition to these works, a number of books in India on agricultural geography have been published in recent years.

Being a dominant sector of economy and life-line of people, agriculture has considerably drawn the attention of geographers practicing in the state of Assam. This is well reflected in the attempts of geographers to unfold the local and regional realities connected with agrarian practices and pattern. The pioneering works on agricultural geography of the region was made by Das (1980, 1984). Das made a detail study of various facts of general and agricultural land-use in the state of Assam along with problems caused by small and fragmented land holdings in the performance of agriculture. Datta’s (1983) work relating to Agricultural occupance of Nagaon district is another valuable contribution to agricultural geography. Bhagabati (1990) presented an exhaustive study on the land problems of Assam with special reference to Nalbari district. Saikia’s (1987) study is concerned with the relation between the size of land holding and the crop productivity level in the thickly populated Nagaon district of the state. Another attempt to access the pressure of population on the agrarian land with in the Pagladia basin of Assam was made by Das (1985).

With the introduction of innovative measures in agriculture on one hand and growing demand for agricultural produces on the other the topics relating to cropping
pattern, intensity of cropping and changes in agricultural practices use to attract the attention of the agricultural geographers. Datta (1983,85), Das and Das (1989), Bhagabati (1990) analysed the cropping intensity pattern and established their relation with population structure, density, irrigation facilities and physical bases etc.

The rate of growth and pattern of agricultural development indicate the economic dynamism of an area. Encouragingly, a number of geographical studies are directly concerned with various aspects of agricultural growth and development in Assam. Das (1978) carried out a study on the problems of agricultural growth in Assam. While assessing various facts of agricultural development, Bhagabati (1984, 90) developed a model in order to identify the complex pattern of agricultural development in Assam. Kakoti (1985) discussed the pattern of agricultural innovation and its impact on agricultural change in Bajali Block of Barpeta district, Assam. Konwor (1986) analysed the problems of agricultural development in Morigaon subdivision of Assam and called for removal of structural and socio-economic constraints of agricultural development in the area.

As regards the agricultural regionalization, the attempt of Barman and Das (1978) to regionalize the state of Assam on the basis of crop association pattern is important. Sharma (1976) delineated agricultural regions in the Brahmaputra valley, Assam by applying suitable quantitative techniques. In respect of planning for agricultural development, the work of Taher (1975) on regional basis of agricultural planning in the Brahmaputra valley, where he correlated the cropping pattern with the ecological setup of the valley was important.

As regards the agricultural geography of the Sonitpur district; very little works have so far been done. However the work of Bhagabati (1990) on social structure and agricultural performance in Dolabari irrigated area of the district is found to be
important. The work of Saikia (2000) on the pattern of agricultural land use changes in Sonitpur district, Assam is also significant.

1.6 Organization of the Work

The work is organized in two parts. The first part portrays the introductory aspects on the central theme of the study and the physical and socio-economic background of the region. The first part contains two chapters. The first chapter is introduction; the second chapter depicts the geographical background of the study area.

The second part of the work containing seven chapters represents analysis, observations, findings and suggestive recommendation on the central theme of the work. Chapter III containing five sub-chapters represents general land use pattern and changes. This chapter reflects mainly the changes in various categories of land use both over space and time. Chapter IV, namely Cropping Pattern mainly underlines the cropping pattern over space and time, intensity of cropping, concentration of some major crops, and diversification of cropping over space and time. Chapter V containing two sub-chapters underlines the trend of change of productivity of some major crops and spatial pattern of agricultural productivity. Chapter VI containing five sub-chapters throws light on various innovative practices in agriculture of the study area like irrigational infrastructure, fertilizer consumption status, level of agricultural mechanization, introduction of HYV and new varieties of crops along with market and transport infrastructural support base. Chapter VII containing two sub-chapters represents participation of various social groups in agricultural development. Chapter VIII is an exposure over spatial pattern of agricultural development based on selective factors and indices. The last chapter, i.e. Chapter IX contains summary and conclusion of the work.
<table>
<thead>
<tr>
<th>References</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Banerjee, B. (1954)</td>
<td>“Relief as a Factor in the Location of the West-Bengal Tea Garden”, <em>Geographical Review of India</em>, vol. 16, No. 2.</td>
</tr>
</tbody>
</table>


