PREFACE

Agriculture is not only an important economic activity but also a form of social heritage and a way of life for the millions of Indian farmers. This agriculture sector in India contributes nearly half of the national income, provides jobs to about 3/4th of the population and supplies bulk of the raw materials required by the non-agriculture sectors. Transport, marketing, processing and other aspects of agriculture production and utilization have also a high bearing on the national economy. Therefore the agriculture in India continues to be an area of vigorous research interest for the social and natural scientists. The year when First Five Year Plan (1951) was launched, thereafter Indian agriculture began to progress. In some parts of India progress in irrigation and farm practices have tackled the basic problems of low agricultural productivity and rural poverty. Climate is one of the major physical factors influencing Indian agriculture. The uncertainty of monsoon rains is barrier for the uninterrupted growth of agriculture in India. As a result droughts linger atleast thrice in a period of ten years. While floods cause
lot of damage to crops, soil, men and material in certain areas of India. It is undoubtedly a well-known fact that the food production in India is not keeping pace with the population increase, where 69 per cent of the working population is engaged in agriculture whose contribution to the national income is about 45 per cent. This is mainly because the agricultural lands are not being coaxed well and the yield efficiency of even major crops are very low compared to the world standard. The problem of food production to feed the growing millions of Indians is a complex one. Even though a number of investigations have been made on this particular problem sponsored by the Indian Council of Agriculture Research, Planning Commission, National Council of Applied Economic Research, Ford Foundation Team, Food and Agricultural Ministry, and other organizations and research institutions, they have not discussed properly the factors responsible for the regional differentiation of agricultural production. After more than ten years of Green Revolution and substantial increase in production particularly in foodgrains, there still exists acute food shortage in some parts of the country. It is particularly the higher increase in population growth.
than the growth of foodgrains and secondly due to the uneven distribution of agricultural technology throughout the country. The existing problem in Indian agriculture is so complicated and complex that a single discipline will not be enough to find out the actual truth. In order to understand the real problem an integrated approach is needed. Therefore, the role played by Geographers, Economists, Sociologists and Agricultural scientists will be largely helpful in finding out the core of the problem. Therefore the present study "Agricultural Geography of Dharwad District" seeks to examine the various aspects of agriculture in spatio-temporal context.

Land and water are the basic infrastructure for agriculture. The cultivated land can be increased by two to three times, if the cropping intensity in India is stepped-up from the present 120 per cent to 200-300 per cent. But this can be possible only if water is available to irrigate crops for the second or third time in the year in the same field. The entire available water reserve of about 100 Kmhm(million hectares metres) is expected to be harnessed in the next 12-15 years. The total irrigated area at that time will be nearly
50 per cent of the gross cultivated area of 210 million hectares. The total agricultural production from a gross area of 155 million hectares now is around 150 million tonnes which means the average yield is less than a tonne per hectare, while in China it is about four tonnes. India must produce about 235 million tonnes of food-grains by the end of this century to feed an anticipated population of about 950 millions. Irrigation claims more than 90 per cent of the water available. But in future it is estimated that the allocation of water to agriculture will be reduced to about 77 per cent in the next 12 years because of increasing demand of water for industrial and municipal needs. Since agriculture takes the bulk of the nation's water budget, saving even a small percentage releases a lot of water to meet other needs. The irrigation efficiency in major river projects has been projected at about 30 to 35 per cent. Raising the efficiency by 10 per cent will save enough water to supply new areas. The investment per hectare in irrigation projects has been very high in the last five to ten years. The cost which was about Rs. 1,500 per hectare in the First Plan period is presently between Rs. 30,000 and 40,000 per hectare. Modern methods to
economise on water use must be devised to increase productivity and bring more areas under irrigation. This will also minimise the hazards of water-logging which renders large areas saline. It is estimated that the average annual surface flow of water is 180 Mhm, of which only about 70 Mhm is harnessable because of terrain conditions, sporadic rains and a dearth of suitable sites for dams. Similarly the annual recharge of groundwater is an estimated 50 Mhm and the amount utilized is about 35 Mhm. This utilizable amount depends on not only the quantity of water available, but also its quality.

Not all this water (105 Mhm) would be available for irrigation as there would be demand for municipal and industrial purposes. Though the irrigated area of 21 Mhm in 1950-51 is increased to 68 Mhm at the end of sixth plan the entire utilizable water will be harnessed only by 2000 A.D. In states like Tamil-Nadu all the water resources have been fully used, but the percentage of irrigation is only about 45. In Maharashtra, Karnataka, and Gujarat, even after using the all available water, the percentage of irrigated sown area will be less than 40 per cent. Improved methods of irrigation
become essential not only for increasing the area of irrigation but also for more production. The increasing scarcity of water is a matter of serious concern. Only through a major effort of water saving will it be possible to maintain a reasonable growth rate of that part of the national income dependent on irrigated agriculture in areas where water is a limiting factor. There is an urgent need to find out ways to increase water supply. Rainfall being constant the other alternatives are desalination, salt water utilization, re-use of water, weather modification and improved water management practices or new irrigation strategies.

Considering all the above views and aspects of agriculture, geographers can certainly play their role in understanding the problems of land use and agriculture of all the regional levels like micro, meso and macro. In this regard Dharwad district which is a conglomeration of wet and dry weather features and also the mixture of different soils represents a typical region to study the agricultural geography.

The Main Objectives of the Present Study are:

To make indepth and comprehensive analysis of various aspects of Agriculture Geography of Dharwad district such as:
identifying the impact of climate on agriculture, to understand different types of factors that are responsible for spatio-temporal changes (1975-76 and 1985-86) of landuse, cropping pattern, crop-productivity, agricultural efficiency, levels of agricultural development, regional disparity, agricultural situation at grass-root level and the role of infrastructural facilities.
Hypothesis:

The following hypothesis designed for the present study is examined in different chapters of this thesis:

1) The decreasing trend of rainfall or its oscillation during crop season in Dharwad district can adversely affect the practice and agricultural productivity.

2) Irrigation if properly used can increase the land-use efficiency, per hectare yield and thereby regional growth in terms of economic objectives can be achieved. If water is misused, the agricultural productivity can be reduced and also cause a damage to the soils structure leading to formation of wastelands.
3) Small and very small size land holdings and economically poor farmers cannot contribute more for the overall growth of agriculture.

4) Increased network/number of infrastructure can help to improve the agricultural efficiency.

5) Higher percentage of literacy and urbanization can lead to the improvements in the reducing regional disparities which thereby will influence on higher growth of agricultural productivity.

6) The locational advantages to villages can play a significant role in enhancing the agricultural productivity, awareness among the farmers about the use of modern technology etc.

7) The increasing number of population damages the overall efficiency of agriculture in Dharwad district.
8) The political and social leadership in a particular taluk can also influence on the agricultural productivity in particular and overall development of taluka.

9) The migration of agricultural labourers adversely affect on the agriculture development.

10) The misuse of land, the delay in decisions from court of law regarding land disputes etc can also influence to certain extent on retarded growth of agricultural development.

Thus the present study is a humble attempt made by this researcher to put-forth the spatio-temporal dimensions of agricultural geography of Barwad district and also draw the inferences. The present thesis is an outcome of exhaustive field work, reference studies, case studies, discussions with farmers, village leaders, village administrators, agricultural officers, geographers, agricultural scientists, district planning authorities of irrigation, agriculture, statistics.
transport and industries. The contents of this thesis are the outcome of overall approach made by this researcher. He is aware of the merits and demerits of the techniques/methods adopted in the thesis. The entire study is divided into four parts consisting of eight chapters. The photographs are to be treated as not merely important references but also eloquent evidences of field work by researcher. Data analysis is made with appropriate formula and results are presented on maps. The multiple regression analysis and correlation matrix are worked out with the help of computers.

In suitable chapters the cause and effects are identified and suitable suggestions are also included. If there are any too many details on a particular aspect i.e. may be physical or crop land use etc. they are given in order to make the things more clear to the foreign examiner (outside India) of this thesis.
As a researcher I feel that the research is an infinite thing for which the present thesis is very minute but unique contribution. I hope that the study in the present Doctoral thesis is an endeavour in understanding the possible wholesome personality of research. Therefore this thesis is not an end in itself. My efforts will continue further in order to make my knowledge in the field of agricultural geography of more comprehensive in nature for which perhaps, my age long future has to be dedicated. It is my great desire that my Mother-India should not only become self-reliant in food production but also it should lead to help to other countries of Third-world by producing five to six times more than what it is today and I also expect that my Mother India will come down in the hierarchy of its growing population.