Introduction

Tea, *Camellia sinensis* (L) O Kuntze is one of the most important plantation crops of India and contributes significantly and substantially to the national economy. Its cultivation is spread over more than 3,96,000 hectares of land, divided into two distinct regions - the North Indian tea belt located between 22 - 27^0 N and the South Indian tea belt, located at 7^{0}N. North-East India produces 75% of the total Indian tea in three different landscapes (Jain, 1991) - the hilly terrain of Darjeeling upto an elevation of 2000 m, yielding the world's finest quality teas; the extensive riverine flat plains at the base of Himalayan ranges - the Terai and Dooars; and the Brahmaputra valley of Assam located at 100 m above sea level which is the largest flat plains of the world and which accounts for more than half of Indian production. With great emphasis being given to increase productivity in tea, more and more non-conventional areas are being brought under tea cultivation, coupled with replanting old sites with vigorous and highly productive tea (Banerjee, 1993).

The young leaves and unopened buds of the tea plant are plucked for beverage production. Foliar diseases of tea cause enormous losses as they reduce the quality and quantity of tea productin. Among the many foliar fungal diseases of tea, brown blight, caused by *Glomerella cingulata* (Stoneman) Spauld & Schrenk is common in all tea growing areas. The fungus generally gains entrance through a wound or into tissues that in some way have been weakened (Baxter, 1974; Bertus, 1974; Dickens and Cook, 1989). The disease patches usually start on the margin of the leaves and spread inwards. When two or more patches occur side by side, the whole leaf may be affected. The edges of the patches are sharply defined and mostly marked with a delicate concentric zonation. The colour of the upper surface is yellowish to chocolate browh at first, gradually changing to grey from centre outwards. Minute black, scattered dots which are the fructifications, appear on both sides of the diseased patch. The affected portion of the leaf finally turns over and shrivels up.

Environment plays an important role in regulating a plant's growth and development. Plant responses to the environment are normally expressed by changes in total dry matter production and harvestable yield (Ng'etich, 1997). Climatic changes also affect plant disease production, but research on impacts of climate change on plant disease has been limited. Most of the research work has concentrated on the effects of a single atmospheric constituent or metereological variable on the host, pathogen, or the interaction of the two under controlled conditions. Climate changes could alter stages and rates of

development of the pathogen, modify host resistance, and result in changes in the physiology of host pathogen interactions (Coakley *et al;* 1999).

Tea, being a perennial, is subjected to a large number of environmental stresses throughout the course of its life, the most important being the climatic variables. The main climatic variables influencing the yield of tea are temperature, the saturation vapour pressure deficit of the air and, through their influence on plant and soil water deficits, rainfall, evotranspiration (Ng'etich, 1997). Along with the influence of climatic variables on the growth and development of tea, it is also expected that they will also influence the development of various diseases. Since no previous work on the role of environmental factors on brown blight disease development of tea has been reported, the present work has been undertaken with the following major objectives :

(i) to determine pathogenicity of *Glomerella cingulata* on different tea varieties; to evaluate the effect of various factors on disease development following artificial inoculation;

(ii) to record the occurrence of brown blight disease of different tea varieties under natural conditions;

(iii) to correlate disease occurrence with various climatic variables- temperature, rainfall, humidity, hours of sunshine, etc;

(iv) to determine the effect of different factors on mycelial growth and spore germination of *G. cingulata;*

(v) to determine changes in phenolic contents of tea leaves of different tea leaves following inoculation with *G. cingulata;*

(vi) to determine the effect of different factors on production of phenols;

(vii) to quantify diffusible phenolics from susceptible and resistant varieties;

(viii) to determine the changes in chlorophyll contents of tea leaves as affected by age of leaves, varietal differences, infection;

(ix) to determine the epicticular wax contents of resistant and susceptible varieties; and

(xi) to study anatomical characteristics of leaves of different tea varieties.

The materials used and methods adopted to achieve the above objectives have been outlined in the following pages along with the results achieved. In the beginning, a review of literature along lines related to the work has also been presented.