Chapter 1
1. INTRODUCTION

Allergic ailment is the common suffering of human beings. The unprecedented growth of population and rapid industrialization have deteriorated the environment to a considerable extent. The various airborne organisms such as viruses, bacteria, algae, protozoans, invertebrates, fungi, mosses, fern spores, pollen, minute seeds and many plant and animal fragments have been identified as the potent sources of allergy. Aerobiology is the science which is devoted to the study of the impact of allergy caused by the airborne organisms above on living beings. Aerobiology focuses on the source, release, dispersal and deposition of bioparticulate matter as well as their impact on man, animal and other plant systems. Aerobiology also analyzes the influence of climatic factors on each of the above status (Frinking and Rijsdijk, 1977). In recent years, there has been much interest evinced in aerobiological studies in view of their application in agriculture as well as in the clinical field.

The practical importance of aerobiology in allergy treatment has been evidently revealed throughout the world (Newmark, 1968; Nilsson, et al. 1977; Bassett, et al. 1978; Solomon, 1984; Singh and Gangal, 1986; Nair, et al. 1986; D’Amato, et al. 1988; Singh and Malik, 1992). In humans the significance of airborne pollen grains and spores in allergic reactions is well known to the millions who suffer seasonal and perennial attack of hay fever. The available
statistics indicate that, in India, nearly 10% of the population suffers from major allergic disorders (Vishwanathan, 1964). The proportion of patients suffering from bronchial asthma constitute nearly 1% of the total population (Anonymous, 1961). The studies conducted with inhalant allergens in various parts of India reveal that 2% to 42% of the population are reported to be atopic (Agnihotri and Singh, 1971; Mittal, et al. 1978; Shivpuri, 1980).

Therefore, it is very essential to know the details of occurrence of these pollen allergens in the atmosphere. Continuous monitoring of the qualitative and quantitative composition of the airborne pollen is of paramount importance in pollinosis (Newmark, 1968; Solomon, 1984; Lewis, et al. 1984; D'Amato and Lobefalo, 1989).

The treatment of patients with pollinosis consists first and foremost of preventive therapy which aims at the elimination of initial effects induced by the pollens. Several immunological research programmes have confirmed that the pollen grains of many trees, shrubs and grasses, especially anemophilous (wind pollinated) produce allergy (Majd and Ghanati, 1995). It is also realised that airborne pollen when released in sufficient quantity may evoke allergic response in sensitive patients leading to pollinosis (Solomon and Mathews, 1988).

Plant pollen is the most common cause of seasonal allergic diseases (Shafiee, 1976). An association between asthma and seasonal pollen exposure was recognised as early as 1872 by Wyman. Meltzer (1910), was among the first to postulate that this association represented an anaphylactic response to airborne pollen.
Basically, there are three ways in which pollen come in to contact with humans. They are identified as inhalants, ingestants and contactants; that is, pollen enter through nose or mouth along with air when a person breathes. Also pollen come into contact with humans through parts such as skin and eyes etc.

In the case of sensitive individuals, pollen produce allergic symptoms such as sneezing, itching of eyes, nose and skin, breathlessness, asthma, watering of eyes, running nose, and frequent coughing.

Considering their clinical implications, several investigations on airborne pollen had been conducted in India during the last two decades, especially in the Gangetic, Peninsular and Coastal regions of India (Chanda, 1978; Nair, et al. 1986; Singh, 1984).

In Tamil Nadu also, the aeropalynological research was carried out at first in Vellore by Nair (1963) and some preliminary investigations were carried out at Tiruchirapalli (Nair, et al. 1986). However, no comprehensive study has been carried out on the hill stations. It is found that, in hill stations, the natural vegetation has been subjected to much pressure from the introduction and plantation of exotic plants for commercial purposes which is reflected in the nature of airborne pollen flora. The introduction of a large number of exotic species under afforestation programmes and for agro-commercial purposes has aggravated allergic diseases. The reports from the western countries proved that the exotic species introduced in India could be potentially allergic (Spieksma, 1990). However, no systematic studies on the
impact of airborne pollens of exotic species as a bio-pollutant have been made on the environment in general and respiratory allergy in particular. Keeping this in view, the present study has been carried out at the hill stations of Ooty and Coonoor of the Western Ghats, located in the Nilgiris district of Tamil Nadu (India).

The Nilgiris district is located between 11° 11’ and 11°42’ N latitudes and 76° 14’ and 77° 01’ E longitudes. The altitude ranges from 300 m to 2,634 m at Dodabetta, the second highest peak of the Peninsular India.

The administrative district of the Nilgiris is spread over an area of 957 square miles comprising of four revenue taluks, namely, Ooty, Coonoor, Kothagiri and Gudalur. Of these Ooty, Coonoor and Kothagiri taluks are on the upper plateau with an elevation of 6,500 ft mean sea level and above while the lower plateau (Gudalur taluk) has an elevation of about 3,000 ft above mean sea level.

In this study, the emphasis has been given to analyze the impact of pollen grains on human beings. The present research is carried out at Ooty and Coonoor with the following objectives:

1. To study the phenology of exotic monoculture plant species contributing pollen to the aerospora of Ooty and Coonoor,

2. To identify and characterise the exotic monoculture and abundant airborne pollen from the air of Ooty and Coonoor,
3. To determine the influence of meteorological parameters such as temperature, relative humidity, rainfall and wind velocity on pollen of the hill stations,

4. To find out the seasonal and annual variations, if any, in concentration of the pollen in the atmosphere at Ooty and Coonoor,

5. To prepare a pollen calendar

6. To collect airborne pollen grains in bulk for preparation of antigen extracts,

7. To determine the allergenically significant pollen types with the help of clinical studies,

8. To carry out biochemical investigations on Acacia, Cupressus and Pinus pollens and

9. To compare the airborne pollen of Ooty and Coonoor.

Further, it aims at offering guidelines on the allergenically significant pollens to physicians dealing with respiratory allergy patients, particularly in the hilly regions. This will also help in preparation of regional antigen kits in management of allergic disorders by advising the patients to move to safer places during the onset of pollen season in the respective areas.