INTRODUCTION

Aerobiology is concerned with distribution of living microorganisms in air and the resulting consequences. All the living microorganisms, studied in Aerobiology are generally referred to "Airspora" (Gregory, 1952). Aerobiology is a multidisciplinary branch of science which deals with emission, dispersion and dissemination of micro/nanosized particles through the atmosphere and impact on plant, animal and human life. It has great importance and significance in many fields such as medicine, human health, genetics, microbiology, agriculture, epidemiology, meteorology, animal health, ecology, industrial and environmental hygiene, biosecurity, engineering, etc. (S.T.Tilak 2009).

Aerobiology is a scientific and multidisciplinary approach focused on the transport of organisms and biologically significant materials. (Edmonds and Benninghoof 1973). Aerobiological investigations include the study of passively air borne microorganisms of their identity, behavior, movement and survival. The field of aerobiology is often considered as the 'microbiology of atmosphere' as it deals with the study of dispersion of insect population, fungal spores, bacteria, viruses, molds and all forms of life both plants and animals that are borne aloft and transported partially or wholly by the atmosphere.(Jacob 1951).

Aerobiological investigations are generally considered as Botanical and Fungal aerobiology, Medicinal aerobiology, Technical or industrial aerobiology and experimental aerobiology. (S.T.Tilak 1998)

a) Botanical and fungal Aerobiology- This is an important outdoor field of aerobiology which deals with dispersal of microorganisms causing plant diseases, dispersal of pollen, causing allergenic reactions on animals and human beings. Indoor botanical aerobiology deals with the dispersion of microbes in green houses, caves, glass houses, grain storage godowns and library buildings.

b) Medicinal Aerobiology which studies the influences of pollen grains, fungal spores, mites and dust on human beings and animals.

c) Technical / Industrial Aerobiology are concerned with the influence of air pollutants on the environment.

d) Experimental Aerobiology deals with fundamental concepts like mathematical formulations, development of methods, instrumentation and methods of modeling of aerobiological systems.

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Concept of Aeromycology:-

Fungal spores contribute an important part of bioaerosol. Fungi are often well adapted to airborne dispersal of their spores having either tall conidiophores or specialized liberation mechanisms to eject spores forcefully. In the course of evolution, the fungi have probably exploited the wind for their dispersal more thoroughly than any other group of organisms and consequently dominate the airspora (80% - 90%). The screening of air is carried out to investigate dispersal of fungal spores in air called as "Aeromycology". In general aeromycological investigations take into account the identification of source, mode of release, dispersal, deposition, impaction and effect of impaction on the various living systems. The fungal spores and hyphal fragments are commonly recorded in the air and are important for the survival and subsequent continuation of generations.

The occurrence and dominance of fungal spores in air depends on variety of environmental factors like rainfall, humidity, temperature, wind speed, direction etc. In several aeromycological investigations by various workers in India, this relationship has been clearly brought out. Recently Mahesh Roy and Tiwari (2003) have carried out detailed investigations of the role of meteorological factors and its relevance to occurrence of fungal spores in the air. (S.T.Tilak 2009).

The aeromycological studies in India can be classified as

1) Outdoor or extramural Aeromycology – It deals with the distribution of fungal spores in the open atmosphere like crop fields, vegetable fields, etc. Such type of studies was found to be useful in understanding the problems of airborne plant diseases as well as the consequences of aeroallergens on human health. At present there are a number of investigators are engaged in studying variety of problems correlated with the airspora of the free atmosphere. Present investigation deals with this aspect.

2) Indoor or intramural Aeromycology – It deals with study of air sample in a closed environment like library, buildings, hospitals, dairy, poultry farm, cow shed, etc. Many airborne microbes are responsible for biodeterioration of storage materials, equipments, library materials and archives.

3) Experimental Aeromycology – It deals with fundamental concepts like mathematical formulations, development of methods, instrumentation and methods of modeling of aerobiological systems.

4) Health hazards due to air borne fungal spores.

Many fungal spores are causing serious diseases to plants; animals and human beings. They are responsible for enormous damage to economically important crops. Thus knowledge of concentrations of airborne fungal spores is especially important for agricultural and occupational medicine. Aeromycology has its application in agrobiology, particularly with respect to pathogenic fungi and in the conservation of the artistic heritage. Such investigation leads to have an idea about release, dissemination, spread, seasonal variation and infective ability of fungal spores.

In India much more work has been done on airspora indicating it has rich and varied airspora. India is agriculture based country. Most of land is under agricultural cultivation. Thus there is great need of undertaking aeromycological studies in various regions of this country to find out the various airborne fungal spores present over the crop fields. While considering the previous studies, efforts were taken for "Aeromycological studies over Wheat and Groundnut fields in Karad region". In present investigation two different crop fields are selected. This investigation belongs from extramural aerobiology.

The present investigation deals with study of Aeromycology over cereal crop wheat (*Triticum aestivum* Linn.) and oil-seed crop groundnut (*Arachis hypogaea* Linn.) fields in Karad region. This study deals particularly with analysis of pathogenic and non-pathogenic fungal airspora over wheat and groundnut fields. The study further includes concentration of different fungal spore types, their identification and seasonal variations with respect to meteorological conditions. This investigation would be used in establishing disease forecasting system for prevention, avoidance and protection of wheat and groundnut from diseases.

Mishra and Shrivastava (1969) at Gorakhpur, Sewalikar (1995) at Aurangabad, Ambore (2003) at Kanchanwadi, Aurangabad and Suryawanshi (2002) at Anadur, Osmanabad and many other workers carried out aeromycological studies over wheat crop.

Wheat (*Triticum aestivum* Linn.) is an annual crop of family Poaceae. It is a major crop of temperate regions of the world. It serves as a staple food in 45 countries of the world and provides 20% of the total calories of the human race. It contains more proteins, starch, soluble sugars, cellulases and hemicellulases, fats, various minerals like P and Fe, vitamins like thiamin, nicotinic acid, riboflavin and niacin and most important to all gluten and lysine contents of the proteins. Wheat supplies more

nutrients for human consumption than any other single food crop. Besides its value as food grain, wheat straw is also important cattle feed. It is also used for manufacture of beer, other alcoholic beverages and starch.

Wheat is susceptible to many diseases, the most important of which are rusts and smuts.

The important diseases and their causal organisms are as below-1) Rust Diseases -

a) Black / Stem Rust	-Puccinia graminis tritici, (pers) Erikss
	and Henn.
b) Leaf Brown Rust	-Puccinia recondite, Roxb.ex.Desm.
c) Yellow / Stripe Rust	-Puccinia striiformis, west.
2) Smut Diseases –	
a) Loose smut	-Ustilago nuda (Jens) Rostrip.
b) Flag smut	-Urocystis tritici, Koerne.
3) Bunt Diseases –	
a) Powdery mildews	-Erisyphae graminis tritici. E. Marchal.
b) Leaf Blight	-Alternaria triticina. Prasada and Prabhu.
c) Septoria Leaf Blotch	-Septoria tritici. Rob.
	Perfect stage- Leptosphaeria nodorum.
	Muller.
d) Leaf spot and Ear Cockle	-6 species of Helminthosporium.
e) Root rot	-Pythium graminicola, Subr.
	-Pythium arrhenomanes. Dreschsl.

During the investigation period, Black Stem Rust, Loose smut, Leaf spot and Leaf Blight diseases of wheat were observed.

Groundnut (*Arachis hypogaea* Linn.) is an annual plant of family Fabaceae. It is an important oilseed crop of many tropical and warm temperate regions of the world. India occupies the first position, both with regard to area and production in the world. The oil contents of the seed vary from 44 to 55 percent, depending upon the varieties and agronomic conditions. Its oil finds extensive use as vanaspati ghee. It is also used in manufacturing soap, cosmetics and lubricants. Oil is rich in proteins and vitamins A and B. Being a legume with root nodules, it is capable of fixing atmospheric nitrogen, thereby improving soil fertility. Out of a total area of 86.72 lakh hectares under groundnut in India, Rajasthan covers 2.46 lakh hectares. Other groundnut producing states are Andhra Pradesh (24.96 lakh ha.), Gujarat (19.42 lakh ha), Karnataka (13.26 lakh ha) and Tamil Nadu (10.81 lakh ha). Looking to the high production efficiency of groundnut crop, supplemental irrigation is also being provided, particularly to the high yielding strains in Gujarat, Andhra Pradesh and Karnataka states. In Rajasthan this crop is grown over 38.95 percent of the area under irrigation in Bikaner, Ganganagar and Jaipur districts where the productivity of this crop is high.

Groundnut is susceptible to various fungal, viral and pest diseases. The diseases are either air borne or soil borne. The important diseases and their causal - organisms are as below

1) Tikka Disease	- Cercospora arachidicala Hori.
	- Cercosporidium personatum (Berk and
	Curt) Deighton.
2) Rust Disease	- Puccinia arachidis Speg.
3) Leaf Spot Disease	- Alternaria arachidis.
	- Alternaria alternata Fr.
4) Anthracnose Disease	- Colletotrichum dematium.
5) Seedling Blight Disease	- Aspergillus niger.

During the investigation period, Tikka disease, Rust, and Leaf spot diseases of groundnut were observed.

Sreeramulu (1970) extensively worked out the rust diseases of groundnut. Jadhav D.S. (1990) at Kallam, Deshpande (1992) at Ambejogai, Baviskar (1993) at Chalisgaon, Aher S.K. (1993) at Ahmednagar, Mahale M.D. (1996) at Faizpur and many other workers carried out aeromycological studies over groundnut crop.

During the investigation period, special emphasis is being made to detect the pathogenic fungal spores, its concentration in the atmosphere, their identification and seasonal variations with respect to meteorological conditions. It was intended to provide data on chief constituents of airspora based on qualitative and quantitative analysis, the diurnal and seasonal periodicities, the effect of weather, dry conditions, and fungal material present on vegetation adjacent to the field.

A significant practical utility of Aeromycology is the relevance of such investigation, in devising disease forecasting system or warning system to farmers in preventing the impending onset of epiphytotics. Such aeromycological investigations have significant role in disease forecasting system and helped in preventing epidemics and subsequent crop loss. (S.T.Tilak 2009).

The present investigation was carried out with the help of Tilak's Continuous Air Sampler with 75% collection efficiency. It was kept at 1 meter above from ground level. The samples were collected after every 7 days continuously from each field during the investigation period. The meteorological data i.e. temperature, humidity and rainfall were recorded during the investigation, because these factors may affect the concentration of airspora of any location.

Scanning of slides was done regularly under the microscope to identify the fungal spores. These observations are recorded in the order of dominance of respective groups. Detail description of airspora is shown in respective tables. Some of the fungal genera are given in photo plates.

The aeromycological studies of crop fields were carried out with respect to

- Concentration of different fungal spore types.
- Occurrence of hyphal fragments, insect scales and pollen grains.
- Some unidentified fungal spores.

All the work done is summarized in the summary and conclusion part of the thesis.



