

REVIEW
OF
LITERATURE

The term aerobiology came into use since in 1930 as a collective term for the studies of airspora, like air borne fungal spores, pollen grains and other airborne microorganisms. (Jacobs, 1951) it includes dispersion of insect population, fungal spores, pollen grains, bacteria, viruses, moulds and all forms of life both plants and animals which become airborne and transported partially or wholly in the atmosphere. They are now included in the studies of aerobiology. In case of aerobiology, due to variable consequences of such microorganisms on human life it has become a verge, independent and recognized branch, which show a deep rooted nature.

In recent years the studies in aerospora are much vaster. But still on grass root level it shows clear cut connection with "Ancient literature". In "Atharva Veda" and "Ayurveda" (1000 B.C.), It was clearly suggested that inhalation of contaminated air initiates diseases of respiratory tract. Lucretius (500 B.C.) also has been credited to suggest the role of contaminated air in causing respiratory diseases. Indian ancient literature also touched some of the modern concepts of plant pathology and allergy. All the hazardous effects of contaminated air were known to ancient people and thus in ancient literature some tasks were mentioned for purification of air in the house and surroundings like "Agnihotra". Thus one can say that ancient literature had touched some concepts of modern Aerobiology.

The field of Aerobiology has its origin in the experiments of some aerobiologists. While working on combating theory of spontaneous generation of life and developing germ theory of diseases, the Pasteur (1861) stated that the air is carrier of many common germs. During the last fifty years or so, aerobiology has emerged as a specialized field of investigation. But our existing knowledge regarding the composition of airspora can be said to have started from 1870, when Ehrenberg (1872), first published information on the microorganisms which he has found in the atmospheric dust. After him Miquel (1883) made long term atmospheric survey by volumetric method. Hesse (1884, 1888) used volumetric apparatus for air sampling in Germany, but the actual term Aerobiology was first introduced by Fred. Meier^{et al} (1933) in U.S. Dept. of Agriculture, and he also established this science a specialized branch. After that many investigators from different countries were working on aerobiology.

Indian Status of Aerobiology:-

In India, for the first time aerobiological studies were carried out in Kolkata by Cunningham (1873). His comprehensive work was published in the form of a book entitled "Microscopic Examination of Air".

Though he observed many spores and other vegetative cells in air, he was unable to show relationship between number and types of these air borne spores. Thus their prevalence was called as zymotic diseases. After his pioneer work, late Prof. K. C. Mehta, Agra College, Agra, mainly initiated systematic study on Aerobiology. He carried out extensive studies on cereal rust and hence our present knowledge regarding Rust is based on source of his findings. Later on substantial work was done on Aerobiology by Padmanabham *et al.* (1952), Rajan, Nigam and Shukla (1952), Sreeramulu *et al.* (1962), Ramlingam (1966), Mishra and Shrivastava (1969), Shukla (1971), Pathak *et al.* (1978), Vittal *et al.* (1985), Agashe *et al.* (1988), Verma *et al.* (1989), Raha and Bhattacharya (1992), Giri *et al.* (1994) Rao and Nair (1997) and Zahid *et al.* (1997). However, the origins of recent studies in Aerobiology had its origin about a century ago and were conducted to find out the origin of epidemic diseases like cholera and Typhoid. The science of Aerobiology however has emerged as specialized branch only in last 40 years or so.

Status of Aerobiology in Maharashtra:-

In Maharashtra state the aerobiological studies were started when Karla and Dumbery (1857) conducted the survey of composition of air spora at Pune. Later on a valuable work was done by Chaubal and Deodikar (1964), Tilak and Kulkarni (1970-75), Chitale and Bajor (1973), Gaikwad (1974), Pande (1977), Mane (1978), Vishwe (1979), Lakhe (1980), Shastri (1981), Mulik (1982), Babu (1983), Pillai (1983), Bale (1984), Khot (1985), Bhat (1986), Rao (1987), Modak (1989), Malabale (1990), Bapat (1991), Kotwal (1992), Baviskar (1993), Aher (1993), Pardeshi and Sathe (1995), Khilare (1996), Qudsia (1997), Deshmukh (2000-02), Khedkar (2005) and Chavan (2006).

Much more work, in India has been carried out regarding the study of Aerospora of both Extramural and Intramural locations.

During the Extramural studies many crop fields were studied as a site of investigation. Kulkarni (1971), reported aerospora over some vegetable and sugarcane fields of Aurangabad, Gaikwad (1974), studied aerospora of sorghum field at Ahmedpur. Pande (1976) reported aerospora over the fields of Mung and Jowar at Nanded. Mane (1978) reported aerospora over some fields of Vaijapur. Lakhe (1980) worked on air spora over some vegetables at Udgir. Shastri (1981) studied air spora of vegetable market at Aurangabad. Bale (1984) studied aerospora over sunflower field at Osmanabad. Kulkarni (1985) carried out aeromycological survey of Kolhapur. Minhaj (1988) carried out aerospora at Nanded-III. Bapat (1991) carried out aerobiological studies over forest nurseries at Aurangabad. Deshpande (1992) also studied air spora over sunflower and Groundnut field at Ambejogai.

Baviskar (1993) reported airspora over groundnut field at Chalisgaon. Sewalikar (1993) also studied air spora of some fields of Aurangabad. Nagia (1994) reported air spora over sunflower field at Mumbai. Study of air spora over safflower and sunflower field at Jalgaon were carried out by Pardeshi (1995). Qudsia (1997) studied air spora over gram and sunflower field at Jalgaon.

During Intramural Studies, many closed systems were investigated by many workers. Pioneering investigations of Rajan *et al.* (1952) from Kanpur, Kathapalia (1960), Mukherjee (1973) pointed out the role of microbes in biodeterioration of library materials, for the first time in India. Tilak and Vishwe (1976) carried out biological investigations, problem of deterioration of wall paintings of Ajanta and Sculptures of Elora at Aurangabad to find out microbial biodeteriorogens. Jogdand (1987) and Tilak and Saibaba (1984) conducted intramural investigation of house dust mites by undertaking house dust survey, clinical investigations & seasonal variations,

From India systematic investigation of air spora above the roof of the hospital is done by Agrawal and his co-workers (1969) from Delhi.

Jay Prakash & Ramlingam (1981, 1983) made an aerobiological survey in the air of working environments including hospitals at Mysore. Talib, Tilak & Babu (1981)

studied airspora of hospital at Aurangabad and prepared fungal flora of Aurangabad. Tilak and Saibaba (1982) studied airspora in the poultry shed at Aurangabad.

The data in Relation to hospital indoor biopollutants is collected by Patil & Kulkarni (1981), Mulik (1982), Chaubal & Kotmire (1985) and Patil (1989). Khilare (1996) studied the aerobiology of four indoor spots at Kolhapur city.

International Status of Aeromycology:-

When fungal spores were identified as a source of many plant diseases and allergies in the atmosphere, in the prior days much more attention was given from the Aeromycological point of view. During investigation of Air spora, Van leeuwen (1924), Jimener Diaz and Sancher (1924) and Hanson (1928) were the pioneers to prove the possibility of fungal allergy in man. Further researchers of Feinberg & Durham (1944), Sheldon *et al.* (1953), Naranjo, (1958) have established beyond doubt that fungal spores play an important role in the etiology of nasobronchial allergy. Due to the rapid investigation in aerobiological work much more fungal spores are identified as causal organisms of many diseases.

The concentration of air borne fungal spores in libraries after agitation of books was reported by Burge et al (1978), Vittal and glory (1985) & Singh et al (1990) reported that Mucorales, *Monilia*, *Sitophila* and representatives of *Penicillium* take an active part in destruction of paper fibers.

Aeromycological Work in India:-

In India a number of aeromycological investigations confined to cereals and crops of economic importance as well as to study the allergic nature of fungal spores.

The pioneer study was made by Prof. K.C. Mehta in (1942-1952). He investigated three rusts of Wheat and Barley by using aero scopes. Later on investigations have been also carried out with reference to diseases of rice, Jowar, Bajara, Sugarcane, Cotton, Sunflower, Groundnut, Potato, Mung and on many other vegetables by various investigators.

Bhatia and Gaur (1979) observed that most of the spores abundant in the air are small in size, produced in large scale and have comparatively simple structure e.g. *Aspergillus*, *Cladosporium*, *Mucor*, *Penicillium* etc. while, the spores of *Alternaria*, *Helminthosporium*, *Cercospora*, *Curvularia* though large in size are very light in weight hence observed more in aerospora. Tilak and M. Babu (1981) reported *Pyrioclaria* spores in air over Bajara Field. Mallaiiah and Rao (1983) observed that an aerial dissemination of conidia of both species of *Cercospora* by using trap. He also studied seasonal & diurnal changes of the aero allergens over groundnut fields.

Verma (1991) investigated bacteria & actinomycetes in Air of Jabalpur market. The airborne culturable moulds of vegetable and fruit market at Bhagalpur (Bihar) were carried out by Tabassum Ghani (1996). Twenty two important market pathogenic fungal genera were recorded from market atmosphere and also some genera on rotten citrus fruits, vegetables and decaying vegetables. According to these observations, *Aspergillus* is an important common and dominant market Pathogen.

Verma and Lalita (1994) studied influence of fungal spore concentration in air of vegetable market at Jabalpur. Sharma & Bora (1994) studied fungal spore concentration in the air of Guwahati.

Aeromycological studies were carried out in Maharashtra:-

Major work has been done on aeromycological studies in Maharashtra at Aurangabad as compared to other regions. Many workers have studied the ⁱntramural and ^extramural aerospora of Aurangabad region. Tilak and Bhalke (1978) studied ^aaeromycology at Aurangabad. Tilak (1980) observed close relationship between rainfall and release of *Ascospores* in the airspora of Aurangabad. Mulik (1982) studied different fungal spores from library area at Satara.

Chaubal and Kotmire (1983, 1985) studied various fungal spores at Kolhapur city. Kulkarni & Kulkarni (1985) did aeromycological survey of Kolhapur city during the year 1976-77. Patil & Kulkarni carried out the aeromycological survey over Tomato Field at Nipani (1988). Chitanvis & Khilare (1996) studied fungal aerospora of Kolhapur city. Kakade & Saoji (1996) studied the fungal aerospora of vegetable and fruit market during Monsoon season at Nagpur city. They reported 32 spore types on Rotorod sampler &

recovered 25 genera on culture plates in which *Aspergillus* was frequent genus detected.
Patel (2002) studied the Aeromycology over some vegetable fields of Maharashtra.
Ambhore (2003) studied the Aeromycology of some crops in Marathwada, Aurangabad.
Chavan (2006) studied aeromycology over the rice field at Raigad, Konkan.