

JUSTIFICATION

A large segment of the population is allergic to pollen grains, fungus spores, algae, and other airborne allergens. Ragweed pollen causes undue suffering each year. Public health agencies need information on the patterns of distribution of all allergens as affected by meteorological conditions. Because these allergens are so ubiquitous attempts to reduce their number by chemical control measures have met with relatively little success.

Plant pathogens annually cause crop losses in the United States worth several billions of dollars. The spores of many of the most serious of these plant pathogens are widely distributed by air currents. For example, epidemics of wheat rust originate in Mexico and travel northward by means of air currents into the United States and Canada as the season progresses. Research was done in the 1930's by Meier and others to determine spore loads in the upper atmosphere by making collections from aircraft. More recently Pady has reported that smut chlamydospores have been reported over agricultural lands in Canada, the United States, and over the Arctic, the Arctic Ocean, the Atlantic Ocean, and the Mediterranean Sea.

Insects are pests of man, animals, and plants and many species of insects serve as vectors of virus and other diseases. Many of these diseases cause extensive loss of life and human misery. Others affect animals or plants and seriously reduce agricultural productions. Insects are scattered widely by wind currents.

Gene flow in populations, often occurs as a result of air currents dispersing pollen, insects, plant pathogens and other biological material to new areas resulting in the development of new subspecies, races or varieties of pests and allergens as well as hybrid plants.

Although there has been some research on dispersal patterns of pollen grains, spores, plant pathogens and insects, relatively little is known about their distribution patterns as related to air movements (including movements of upper air masses). Information is needed on sources of production of the particulates, the process and factors affecting lofting, the trajectories while airborne, the effects of concentration gradients and diffusion, the factors affecting deposition and viability and phenology or time relations.

It is essential to conduct research on a worldwide basis to learn about the spore loads, their kinds, their viability, their pathogenicity and their distribution patterns in order for man to cope with the increasing demand for food supply and for him to better cope with the health hazards due to allergens.

The report of the first meeting of SCIBP held in Paris in 1964 stated, "It is recommended that SCIBP stress the need for and encourage investigations of the atmosphere as a medium of international dissemination of plant and animal pathogens . . . this would include studies of air currents . . ." The USNC-IBP in their report dated June 1964 stated, "There is a need for a study of atmospheric microflora by simultaneous observations at strategic locations around the world, taken at 'human level' and at designated levels above."

Recent interest of meteorologists in the effects of meteorological factors on wheat rust epidemics led the World Meteorological Organization (WMO) to establish a Working Group on Meteorological Factors Affecting the Epidemiology of Wheat Rusts under its Committee for Agricultural Meteorology. As Zadoks of this Working Group points out there is need to forecast rust epidemics and a thorough knowledge of both wheat and rust phenology is essential to forecasting together with knowledge of aerial spore dispersal. The same information is essential to the forecasting of many other plant disease epidemics.

Hirst has stated, "If plant pathologists knew, or if meteorologists could tell them, the odds against any fungus establishing itself at varying distances from sources of known intensity, it might be possible to decide whether quarantine precautions would be effective, to specify the spectrum of diseases which plant to forecast the times when the disease would be introduced so that control measures could be more effectively timed."

With the advent of the industrial revolution the quantity and kinds of air pollutants has been increasing, but not until recent years has the pace been so accelerated. We have also been experiencing a more intensive agricultural system and the relocation of factories into agricultural areas. Thus, we bring the pollutants into closer proximity with humans, other animals, plants, and material that these pollutants seriously affect.