

Plant disease epidemiology

Appearance of a disease on a large number of individual over large areas in relatively short time is an epidemic. Epidemiology deals with the study of outbreak and spread of disease in a population. Essential requisite for an epidemic:-

A) Host related factors:-

- i) Levels of genetic resistance or susceptibility in the host
- ii) Abundance and distribution of susceptible hosts
- iii) Distance of the susceptible plants from the source of primary inoculum.
- iv) Type of crop
- v) Disease proneness in the host due to environments.
- vi) Presence of suitable alternate or collateral hosts

B) Pathogen related factors:-

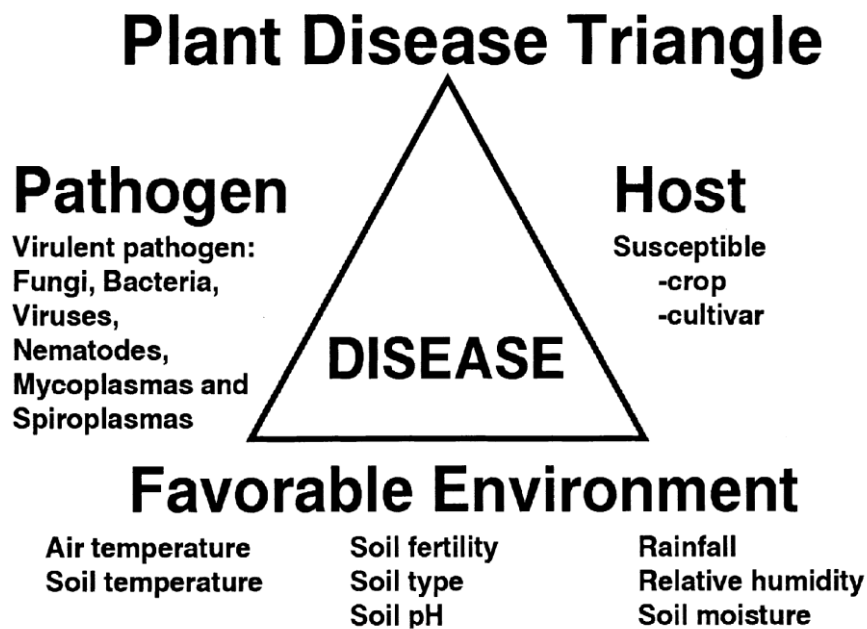
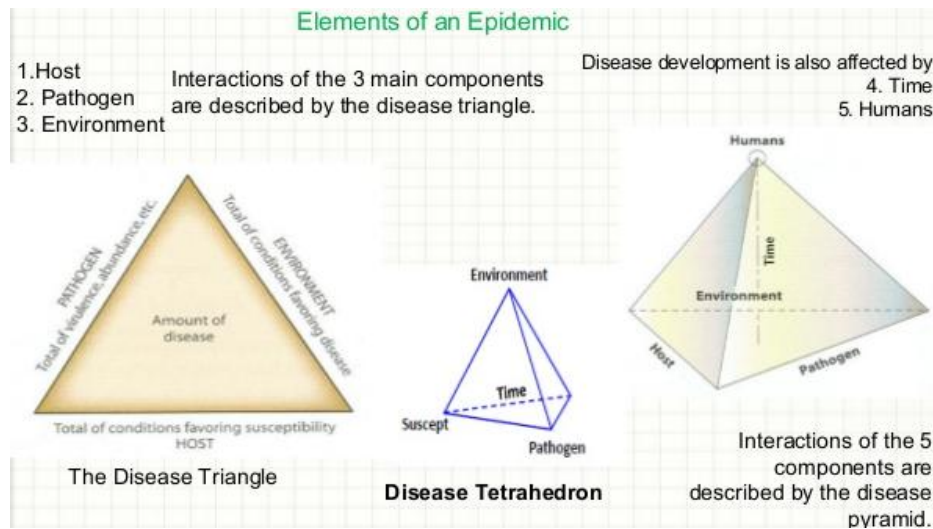
- i) Presence of aggressive isolate of the pathogen
- ii) High reproduction rate of the pathogen
- iii) Low death rate
- iv) Easy and rapid dispersal of the pathogen
- v) Adaptability of the pathogen.

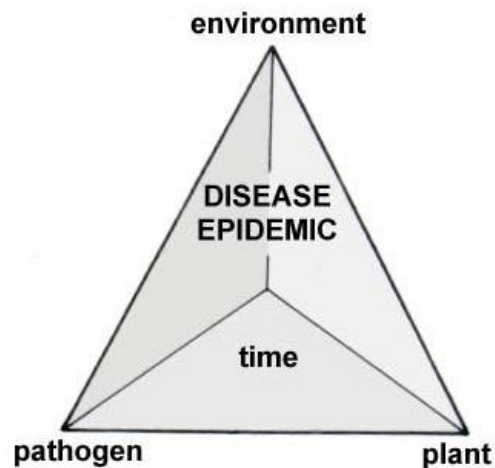
C) Environment related factor:-

The environmental factors that usually influence the progress of an epidemic are moisture, temperature, sunlight, rainfall etc. If all the environmental factors remain favourable then only a pathogen can get well established and cause an epidemic.

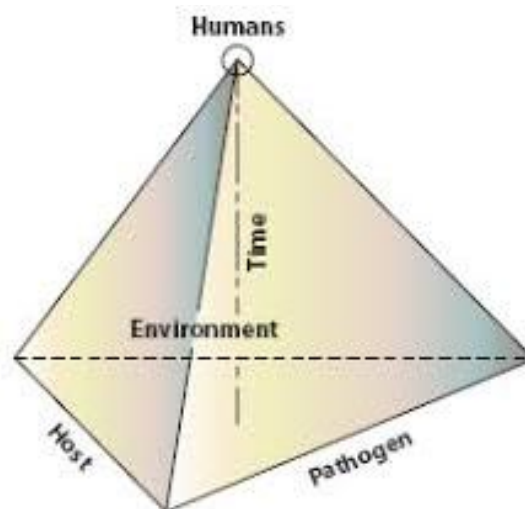
D) Relation of epidemics to human activities:-

The activities of grower in managing the crop have also close relationship with the epidemic. Improper use of fertilizers, chemicals, improper irrigation, infected seed or plant material use, poor sanitation are some human related factor that can be favourable enough to cause an epidemic.





Time is the fourth component of disease triangle. Time can quantify disease along with the effect of environment, pathogen and plant. The specific point in time at which a particular event in disease development occurs and the length of time during which the event takes place affect the amount of disease. The interaction of four components can be visualized as a tetrahedron. The effect of time on disease development becomes apparent when one considers the importance of the time of year, the duration and frequency of favourable temperature and rains, the time of appearance of the vector, the duration of the infection cycle of a particular disease, and so on.



- Disease development in cultivated plants is also influenced greatly by a fifth component: humans.
- Humans affect the kind of plants grown in a given area, the numbers planted, time of planting and density of the plants.
- By their cultural practices, and by the chemical and biological controls they may use, humans affect the amount of primary and secondary inoculum available to attack plants.
- Humans also modify the effect of environment on disease development by delaying or speeding up planting or harvesting, by planting in raised beds by protecting plant

surfaces with chemicals before rains, by regulating the humidity in produce storage areas, and so on.

- The human component has sometimes been used in place of the component “time” in the disease tetrahedron, but it should be considered a distinct fifth component that influences the development of plant disease directly and indirectly.