

Managing plant disease by managing soils

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Meeting the food grain demand of ever growing global population is the big challenge to agriculture sector. Plant disease significantly reduces the production of food crops besides affecting the quality adversely. Losses associated with plant diseases in yield reduction ranging from slight to catastrophic depending upon varying factors. Literature review highlighted that an average yield loss of 42 % from the six most important food crops. It is vital to manage plant diseases to avoid the yield loss, which helps to meet the food grain demand in simple means. In other way, disease management is helping us to meet the food grain demand of increasing population under shrinkage of cultivable area.

Soil borne disease is a serious concern in plant disease management as eradication of pathogen from soil is so difficult. Hence, it is most essential to establish a healthy soil condition to avoid soil borne pathogen. There are multitudes of options available to control the soil pathogens by farmers. This paper elucidates the control of soil borne pathogens lucidly by adopting suitable soil management measures.

Soil borne pathogen can be controlled by varying means. Reducing the population of plant pathogen suppresses the plant diseases and hence, all disease management aims at decreasing plant population in agricultural environment. This can be achieved by increasing beneficial and other general microbial population so that harmful pathogen proportion can be decreased this in turn reduces the contact of pathogen with plant. In other way, introduction of antagonistic microbes is also helpful which control pathogen directly. These antagonistic

microbes compete with pathogens for nutrients, water and space as a result growth of pathogen is restricted and disease development curtailed. Alternatively, in specific cases, antagonistic microbes produce antibiotics which kill the pathogen directly. Predatory microbes directly kill the pathogens. Antagonistic microbes usually exhibit multiple mechanisms as described above.

Soil management for pathogen reduction : Altering soil physical, chemical and biological conditions influences the plant pathogens. Soil pathogen control aims at establishing adverse soil condition for pathogenic microbes so that it does not favour pathogens and significantly reduces plant disease development. A disease suppressive soil is one in which the level of disease that develops on plants grown in that soil is lesser compared to the plants grown in other soils under similar conditions. Most of the soils have some disease suppressive properties. The phenomenon of disease

suppressive soil should be thought of on a continuum from low to high levels of suppression rather than being disease suppressive or conducive. In many cases the disease suppressiveness of soil is decided by presence and activity of microorganisms. Bacteria, fungi, and soil borne fauna are responsible for collectively change the suppressiveness of a soil.

There are two types of disease suppression *viz.*, general and specific suppression. In general suppression, it is hypothesized that reduction of disease is due to the non-specific increase in the activity of the microbial community. General disease suppression is connected to the population and kinds of soil organism presences, soil

