

BENEFICIAL SOIL MICROORGANISMS

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One way by which the pathogenic disease causing organisms can be indirectly suppressed is through the addition of organic matter to mineral soils. In addition to improving tilth, aeration and drainage of soils where organic matter is incorporated, more subtle effects occur at the microscopic level which benefit landscape plants. Organic matter addition enhances population levels of beneficial soil microorganisms (the "good guys").

TOPSOIL BLENDS

All natural soils contain vast populations of microscopic plants and animals present in a state of dynamic equilibrium and changing balances. It has been estimated that within the top one to three feet of soil as much as 17,000 lbs. fungi and 40 lbs. bacteria exist per acre. All the soil microorganisms compete with each other for food and space. Any change in environmental conditions such as food supply, temperature, moisture, oxygen supply, etc., can result in changes which cause one or many types of soil microbes to become temporarily dominant over the others. The majority of fungi and bacteria present in soils are considered to be beneficial to higher plants by: a) direct association with roots (mycorrhizae, nodule forming bacteria); b) breakdown and release of minerals from organic matter present in the soil resulting in essential element availability increases to higher plants; c) parasitizing harmful or disease causing microorganisms or; d) suppressing growth, reproduction or activity of harmful disease causing microorganisms through other interactions such as chemical inhibition.

Harmful fungi and bacteria that parasitize higher plants are generally present in all native soils as well. However, these destructive microorganisms are usually quite genetically specialized for attack of higher plant tissues. They are therefore considered to be weak competitors against beneficial soil inhabiting microorganisms and are less able to withstand survival pressures which occur in the living soil. Generally speaking, the more highly developed the parasitic activity of a given microorganism and the more able this organism is to attack a vigorously growing plant, the less able that pathogen is to survive under natural competition. Those generalized parasites that are only able to infect weakened plants remain as part of the soil microorganism population even without the presence of a host.

Unless a topsoil mix is therefore steam pasteurized or sterilized, there will always be a certain level of disease causing organisms present. However, these same natural topsoil mixes will more than likely contain a high population level of beneficial soil microorganisms; particularly if high in organic matter content.

When organic matter, such as compost or wood residuals, is added to topsoil, the natural organic matter content is raised considerably and increases food source (carbon) availability for beneficial soil microorganisms. It is this addition of compost or wood residual or other organic matter to topsoil which stimulates growth of the saprophytic non-pathogenic type organisms. The presence of fungal mycelia of beneficial microbes breaking down organic matter is not necessarily an item of concern to plants grown in the topsoil mixes. In fact, the obvious presence of saprophytic fungal growth verifies the presence of beneficial soil microorganisms.

Most disease-host interaction is dependent upon environmental conditions. Any "stressful" environmental condition which favors the proliferation and activity of harmful parasitic microorganisms; but inhibits, harms, or otherwise stresses higher plants, will normally result in the disease-host complex establishment. Thus, conditions such as overwatering (low aeration) might result in a proliferation of water mold root rot fungi (pathogen population increase) and plant root system stress for oxygen (lowered host resistance) resulting in

infection. High levels of soluble salts for example can actually cause physical damage to root systems creating an open pathway for entrance by otherwise non-aggressive pathogens and establishment of disease in the roots.

CONCLUSIONS

Mineral soils represent a complex of inert materials and living organisms. By maintaining good organic matter content in mineral soils an increased population level of beneficial soil microorganisms can be maintained. These non-pathogenic fungi and bacteria help to promote well developed, healthy root systems by releasing essential elements and suppressing disease causing microorganisms. Add organic matter for a healthier soil!