List of 4 Major Microbial Interactions

Here is a list of four major microbial interactions:- 1. Clay-Humus-Microbe Interaction 2. Plant-Microbe Interactions 3. Animal-Microbe Interactions 4. Microbe-Microbe Interactions.

1. Clay-Humus-Microbe Interaction:

Clay mineral (and humic substances) affects the activity, ecology and population of microor-ganisms in soil. Clays modify the physicochemical environment of the microbes which either enhance or attenuate the growth of individual microbial population.

After release from clays, the organic material is either degraded by microorganisms or again bind to clays. Microorganisms have a negative charge at the pH of most microbial habitats. The magnitude of electronegativity on cell walls of bacteria and fungi is regulated by pH, amino acid residues and changes in wall composition.

Clay minerals get adsorbed and bind with proteins, amino acids, small peptides and humic substrates. Microorganisms utilize the nutrients for their growth and activity directly from clay- protein, clay-amino acids or peptides, and clay-humic substrate complexes.

Moreover, high levels of clay (e.g. montmorillonite) soil interferes and restricts infection of banana rootlets by Fusarium oxysporumf.sp. cubense, and thus exerts natural biological control of panama disease.

The clays and humic colloids influence the distribution and activity of Streptomyces, Nocardia and Micromonospora. Clay particles (e.g. kaolinite) is known to reduce the toxicity of cadmium (Cd) on Macrophominaphaseolina.

2. Plant-Microbe Interactions:

The above ground (foli-age) and below ground (roots) portions of plants are con-stantly interact with a large number of microorganisms (e.g. bacteria, actinomycetes, fungi, amoebae, nematodes, and algae) and viruses, and develop several types of inter-relationships.

Microbial inter-actions with both above ground and below ground parts of plants are briefly discussed in this section. Moreover, con-sidering the result of interac-tions, it may develop destruc-tive, neutral, symbiotic or ben-eficial association with plants.

Interactions on Above Ground Parts:

Microbial interactions on above ground part of plant occur in a varieties of ways where the foliage especially leaf surface (phyllosphere and phylloplane) acts as microbial niche.

i. Destructive Associations (Diseases):

Plants provide a substantial ecological niche for microorganisms. However, the abundance of this potential niche with respect to any individual microbe is more apparent than real, since a few are able to grow on a wide range of plant species.

Microorganisms show specificity with the hosts, organ, tissue and age of plants. The microorganisms that lead to destructive association are called pathogens. Example of some of pathogenic microorganisms is given in Table 28.1.

Disease development is governed by the resultant of three important factors:

(a) Host susceptibility,

(b) Congenial environment, and

(c) Virulent pathogen.

In the presence of resistant host, unfavourable environment, or a virulent pathogen, disease will not develop.

Plant-microbe interaction occurs at molecular level. In this interaction ‘gene-for-gene relationship’ of H.H. Flor (1940) implies. A gene-for-gene relationship exists when the presence of a gene in one population is contingent on the continued presence of a gene in another population and where the interactions between the two genes lead to a single phenotypic expression by which the presence or absence of the relevant gene in either organism may be recognised.

ii. Beneficial Association (Symbiosis):

The excellent example of plant-microbe interaction resulting beneficial association visualised on above ground part is the development of stem nodules. There are three known genera of legumes

which are known to bear stem nodules are Aeschynomene, Sesbania and Neptunia. The stem nodules develop as a result of interaction between these plants.