MICROBES IN HUMAN WELFARE

MICROBES AS BIOCONTROL AGENTS

Biological control of pests and diseases:

In agriculture there is a method of controlling pests that relies on natural predation rather than introduced chemicals. A key belief of the organic farmer is that biodiversity furthers health. The more variety a landscape has the more sustainable it is. The organic farmer, therefore, works to create a system where the insects that are sometimes called pests are not eradicated, but instead are kept at manageable levels by a complex system of checks and balances within a living and vibrant ecosystem. Contrary to the 'conventional' farming practices which often use chemical methods to kill both useful and harmful life forms indiscriminately, this is a holistic approach that seeks to develop an understanding of the webs of interaction between the myriad of organisms that constitute the field fauna and flora. The organic farmer holds the view that the eradication of the creatures that are often described as pests is not only possible, but also undesirable, for without them the beneficial predatory and parasitic insects which depend upon them as food or hosts would not be able to survive. Thus, the use of biocontrol measures will greatly reduce our dependence on toxic chemicals and pesticides. An important part of the biological farming approach is to become familiar with the various life forms that inhabit the field, predators as well as pests, and also their life cycles patterns of feeding and the habitats that they prefer. This will help develop appropriate means of biocontrol.

Biopesticides

Biopesticides are those biological a!Jents that are used for control of weeds, insects and pathogens.

The micro-organisms used as biopesticides include viruses, bacteria, fungi, protozoa and mites.

Bacillus thuringiensis

Is the example of soil bacterium, Bacillus thuringiensis. Spores of the bacterium produce the insecticidal Cry protein. Therefore, spores of this bacterium kill larvae of certain insects.

The commercial preparations of B thuringiensis contain a mixture of spores. Cry protein.

This bacterium was the first biopesticide to be used on a commercial scale in the world.

An example of microbial biocontrol agents that can be introduced in order to control butterfly caterpillars is the bacteria Bacillus thuringiensis (often written as Bt). These are available in sachets as dried spores which are mixed with water and sprayed onto vulnerable plants such as brassicas and fruit trees, where these are eaten by the insect larvae. In the gut of the larvae, the toxin is released and the larvae get killed. The bacterial disease will kill the caterpillars, but leave other insects unharmed. Because of the development of methods of genetic engineering in the last decade or so, the scientists have introduced B. thuringiensis toxin genes into plants. Such plants are resistant to attack by insect pests.

Bt-cotton is one such example, which is being cultivated in some states of our country.

The very familiar beetle with red and black markings-the Ladybird are useful to get rid of aphids.

Dragonflies are useful to get rid of mosquitoes.

Fungal pathogens are attractive biocontrol agents for weed control in view of their host specificity and ease in production and inoculation in the field.

Trichoderma

A biological control being developed for use in the treatment of plant disease is the fungus Trichoderma.

Trichoderma species are free-living fungi that are very common in the root ecosystems.

They are effective biocontrol agents of several plant pathogens.

Baculoviruses

are pathogens that attack insects and other arthropods.

The majority of baculoviruses used as biological control agents are in the genus Nucleopolyhedroviral.

These viruses are excellent candidates for species-specific narrow spectrum insecticidal application. They have been shown to have no negative impacts on plants, mammals birds fish or even on non-target insects.

This is especially desirable when beneficial insects are being conserved to aid in an overall integrated pest management (IPM) programmed or when an ecologically sensitive area is being treated.