

# Use of Microorganisms in Reducing Hazardous Pesticides Consumption

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## ABSTRACT

Plants are very important for our life. Directly or indirectly, we depend on plants for necessities of our life. Several cereal, pulses, vegetable, and fruit plants are cultivated on large scale to provide food to ever growing population of the world. The cultivated fields are subject to attack by various pests and diseases that may produce epidemics resulting in severe losses to farmers as well as the economy of a country. To protect our plants from losses caused by pests and diseases, pesticides are used indiscriminately and often without adopting the protective measures. These pesticides are toxic chemicals that not only produce hazardous effects on health of the farm workers but also pollute subsoil water and leave residues in the plant produce. Use of water and food with pesticide residues results in different diseases in humans and animals that may lead to death of the individuals in certain cases. Researches have been conducted to find out an alternate method for the management of pest and diseases that can reduce if not eliminate the use of hazardous pesticides.

Use of resistant varieties is the most effective and economical way to protect our crop plants for pests and diseases. But unfortunately, resistant varieties are not available in most of the cases. Development and approval of the resistant varieties for commercial use take several years. Resistance can also be broken down after some time since the pests and pathogens also evolve themselves for their survival. The breeders must work continuously to produce resistant varieties.

Use of organic soil amendment is another method to control pests and diseases specially the soilborne ones. The organic matter added to soil serves as a food for saprophytic soil microorganisms. As a result, the activity and population of the saprophytes are enhanced that leads to antagonistic and parasitic activities resulting in suppression of the activity of soilborne pests and diseases. However, the effect is not long lasting since with the gradual reduction of the added food source, population and activity of soil microorganisms also decrease and as a result, pests and pathogens again become active.

Another promising method of pest and disease management is the use of microorganisms as biocontrol agents that provides a non-chemical and effective method of control. It also provides longer protection since the biocontrol agents also colonize the soil and persist for several years. The selection of an effective biocontrol agents requires a careful *in vitro* and *in vivo* evaluation. Selection of a cheap and effective substrate for mass multiplication of biocontrol agents is the basic requirement for its field application. Addition of suitable carbon and nitrogen sources to cheap but less suitable substrates can lead to significant increase in population of the microorganisms per g substrate. In addition to providing protection against pests and diseases, some biocontrol agents like *Trichoderma* and *Paecilomyces* species and rhizobia also act as biofertilizers and promote the growth of plants. Use of such biocontrol agents can reduce the use of hazardous pesticides as well as toxic chemical fertilizers.