

USES OF BIOPESTICIDES AND BIOFERTILIZERS FOR HUMAN WELFARE

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Biofertilizers and biopesticides are important areas to fulfill the challenges in a sustainable way. Biopesticides are derived from natural materials such as animals, plants, bacteria, and certain minerals widely used for controlling insects and disease causing pathogens.

BIOFERTILIZERS

They supplement chemical fertilizers for meeting the integrated nutrient demand of the crops. ... Application of Biofertilizers results in increased mineral and water uptake, root development, vegetative growth and nitrogen fixation.

These are aerobic free living nitrogen fixers which live in associative symbiosis. In this type of association bacteria live on the root surface of the host plant and do not form any nodule with roots of grasses. It increases crop yield and its inoculation benefits crop. They also benefit the host plants by supplying growth hormones and vitamins. These bacteria are commonly used for the preparation of commercial inoculants.

Blue green algae: Blue green algae (BGA or cyanobacteria) like *Nostoc* and *Anabaena* are free living photosynthetic organisms also capable of fixing atmospheric nitrogen. In the flooded rice fields blue green algae serves as a nitrogen biofertilizer.

Azolla biofertilizers: *Azolla* is a water fern inside which grows the nitrogen fixing blue green algae

•*Anabaena*. It contains 2-3% nitrogen when wet and also produces organic matter in the soil. The

Azolla-*Anabaena* combination Biofertilizer is used all over the world. This can be grown in a cooler regions.

But there is a need to develop a strain that can tolerate high temperature, salinity and resistant to pests and diseases.

Production technology is very easy and can be adopted by rice farmers. The only constraint in *Azolla* is that it is an aquatic plant and water becomes limiting factor in growing it particularly in summer.

Phosphorus solubilising bio fertilizer:

Phosphorus is an important element required for plant growth. This element is also needed for nodulation by rhizobium.

Some microorganisms are capable of solubilizing immobilized phosphorus making it available to plants for absorption.

Mycorrhizal fungi acts as biofertilizer are known to occur naturally on roots of forest trees and crop plants. In soils low in available nutrients there is an increased absorption of nutrients by plants infected with Mycorrhiza. The fungus has the ability to dissolve and absorb phosphorus that plant roots can not readily absorb.

Different agricultural practices, such as the use of crop rotation, cover crops, disease resistant varieties, and good seed bed preparation have been applied to control pests and diseases. However, such practices are not always sufficient protection from crop losses. Because of this, many certified organic growers turn to biopesticides to insure and/or enhance their abilities to grow and market high-quality produce. Approved organic products for plant disease control include many EPA-registered biopesticides. Such products have been developed to control numerous plant diseases and to provide useful tools for growers to decrease the incidence and/or severity of plant diseases.

BIOPESTICIDES

Biopesticides can be used by organic growers can be classified as either microbial or biochemical, based on the active ingredient. Microbial pesticides include live organisms (e.g., beneficial bacteria, fungi, nematodes, and viruses) and/or their fermentation products as the active ingredient. Biochemical pesticides include plant extracts, pheromones, plant hormones, natural plant-derived regulators, clay, potassium bicarbonate, and enzymes as the active ingredient. In this fact sheet, only commercially available microbial and biochemical biopesticides are discussed.

Biopesticides are used primarily as preventative measures, so they may not perform as quickly as some

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synthetic chemical pesticides. However, biopesticides are generally less toxic to the user and are non-target organisms, making them desirable and sustainable tools for disease management. While their use is not overly complicated, the application of some biopesticides may require a high level of understanding and knowledge of the diseases and pathogens that they are designed to control. As with any disease management program, proper timing and application are essential to ensuring efficacy.

To help organic farmers choose an appropriate biopesticide for different plant diseases, we have provided a synthesis of numerous independent field tests for commercially available microbial biopesticides and biochemical biopesticides. Both lists include only products certified for use in organic agriculture by the Organic Materials Review Institute (OMRI). The lists contain the trade name, target disease, crop, and efficacy evaluation results of each product as published in the Plant Disease

Management Reports and Biological Control Tests Database between 2000 and 2009. An efficacy rating based on these reports was established based on the comparison between untreated and biopesticide-treated plants in one or more reports.

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