



Biopesticides: A Natural Approach to Pest Control

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Biopesticides belong to the group of biopesticide products and are referred to as “natural” sources made from India’s plants, animal bodies and cultures, various bacteria, and some mineral creations. In addition to being resources made of toxic heavy chemicals like all other pesticides, biopesticides destroy the life cycle of the pests through biological processes.

Biopesticides: The Classification

Broadly, the bioformulations are classified into three categories:

1. Living Biological Organisms Living organisms are those that can include viruses, bacteria, fungi, etc and can infect pests leading to their death.
 - One such kind bacterial classification is *Bacillus thuringiensis* (Bt) bacterial pesticide, whose toxin will be harmful for specific types of insect pests.
 - Fungal Pesticide – *Beauveria bassiana* and *Metarhizium anisopliae* are examples of fungi that can survive by killing insects.
 - Tropical sticky tilapia with virus-based pest controlling is also possible.
1. Pesticides Biochemical – Such types of pesticides are referred to as pesticides that are harvested from plants or animals and split in laboratories.
 - Derived from plants, there are several insect and nematode altering substances like neem oil, pyrethrum and rotenone.

- Derived from animals, spinosad are such substances and derived from soil bacteria control several kinds of pests.
1. There plants' PIPs genetically engage the plants that are modified genes which are found in other plants.

Merits of the Biopesticides • Benefit to ecology, comfort in the use is one of the most valued features of such biopesticides

Advantages of Biopesticides

Environmental Friendliness: Biopesticides are relatively less toxic to human beings, animals, and the environment in general compared to the synthetic pesticides.

They are lesser harm to plants: they often affect one or a few target pests that are minimized, especially beneficial insects and other organisms.

Controlled Development of Pesticidal Resistance: Biopesticides can help. These resistance mechanisms, which are usually development in the pest themselves, rate of resistance development of a pest to pesticides.

Integrated Pest Management (IPM): Biopesticides can be used along with other pests management techniques in an IPM program so that the impact to the environment is minimal.

Applications of Biopesticides: Biopesticides are employed in a number of agricultural and horticultural settings to control a great number of pests,

It control strains of disruptions spanning over which include aphids, caterpillars, beetles to mosquitos. Weeds are commonly managed in crop and non-crop areas.

Nematodes Post/Inter harvest control of nematodes or plant parasitic nematodes. Challenges and Future Directions But with these advantages, biopesticides face the following challenges towards the concept of wider use:

Costs are high : In the first place, biopesticides may be costlier than their synthetic pesticide counterparts for specific pest controls. ·

Less Storage Life: Very few biopesticides can almost have short shelf life.

Less Potency/less effectiveness: Anyway, they may not always measure up to heavy synthetic pest strength.

Even though in long run it would be very beneficial for sustainable agriculture.