

Biopesticides: Future of Organic Farming

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ARTICLE ID: 07

Abstract:-

Biopesticides are specific forms of insecticides made from natural substances. It comprises the use of natural pest foes including parasitoids and predators, nematodes, and semiochemicals as well as botanicals, microbial pathogens like fungus, bacteria, and viruses, and other microorganisms. Biological resources that are crucial to agriculture provide ecosystem benefits, which justifies the use of biopesticides in IPM programmes.

Keyword: -Biopesticides, Natural enemy, Bio control, Microbial.

Introduction

There are several ways to employ biological to manage weeds, diseases, and pests. Microbial biocontrols may include parasites or pathogens that infect the target pest. They might also hinder or encourage plant host resistance as an alternative. Biochemical biocontrols can work in a variety of ways as well. Some function by stopping a disease or pest from forming, growing, feeding, or reproducing. Yet other biocontrols may be used to erect a barrier on the host in order to act as a feeding or infection inhibitor.

The contribution of biopesticides to insecticide sector accounts for 15% of the total insecticide market. In a successful natural control program, only 15% of biocontrol agents for control of insect pests have been identified. Many efficient species of natural enemies have been discovered and 230 are commercially available today. Almost 90% of the microbial biopesticides currently available in the market are derived from only one entomopathogenic bacteria, i.e., *Bacillus thuringiensis* (Bt).

Agriculture has utilised biological treatments for insect pests since Agostine Bassi showed in 1835 that the white-muscadine fungus (*Beauveria bassiana*) could be used to infect silkworms with a contagious illness. In the 19th century, experiments using mineral oils as plant protectants were also documented. An increasing number of studies and biocontrol suggestions were created during the early 20th century institutional growth of agricultural research.

The first, and still most, widely used biocontrols included spores of the bacteria *Bacillus thuringiensis* (Bt). In 1901, Bt was isolated from a diseased silkworm by Japanese biologist Ishiwata. Berliner in Thuringen, Germany, then rediscovered it ten years later in a diseased caterpillar of flour moth. The Bt pathogen was classified in 1911 as type species *Bacillus thuringiensis* and remains the most widely used biocontrols to this day.

Classes of Biopesticides :-

Biopesticides fall into three major classes:

Plant-Incorporated-Protectants (PIPs):-

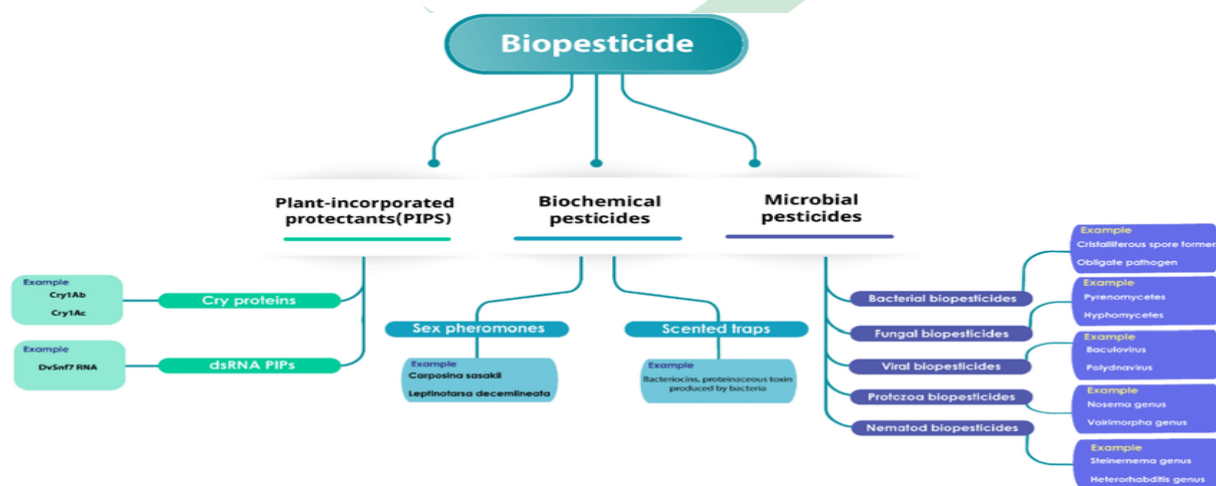
Plant-Incorporated-Protectants (PIPs) are pesticidal substances that plants produce from genetic material that has been added to the plant. Plant-incorporated protectants are pesticidal substances produced by plants as a result of genetic manipulation. the protein and its genetic material, but not the plant itself, are regulated by EPA.

Biochemical pesticides:-

Biochemical pesticides are naturally occurring substances that control pests by non-toxic mechanisms. Conventional pesticides, by contrast, are generally synthetic materials that directly kill or inactivate the pest. This includes insect repellants, insect attractants and repellants, pheromones, and non-pest management class—plant growth regulators.

Examples

- Azadirachtin (broad-spectrum insecticide).
- Capsaicin (compound from chili peppers) (broad-spectrum insecticide, nematocide and fungicide).
- Clove, rosemary and peppermint oil (broad-spectrum fungicide)



Microbial pesticides:-

Microbial pesticides consist of a microorganism (e.g., a bacterium, fungus, virus or protozoan) as the active ingredient. Microbial pesticides can control many different kinds of pests, although each separate active ingredient is relatively specific for its target pest. Microbials are products containing micro-organisms or their fermentation by-products.

Examples:-

The bacterium *Bacillus thuringiensis* for use against caterpillars. The fungus *Beauveria bassiana* for use against whiteflies, aphids and thrips. Plant-incorporated protectant compounds registered for use in greenhouses.

Advantages of Biopesticides

Biopesticides typically affect only the target pest and closely related organisms, as opposed to broad-spectrum conventional pesticides that may affect organisms as diverse as birds, insects, and mammals. Biopesticides frequently work in very small quantities and frequently decompose quickly, resulting in lower exposures and largely avoiding the pollution issues brought on by conventional pesticides. Biopesticides have the potential to significantly reduce the usage of traditional pesticides while maintaining excellent crop yields when employed as a part of Integrated Pest Management (IPM) programmes. To use biopesticides effectively (and safely), however, users need to know a great deal about managing pests and must carefully follow all label directions.

Disadvantages of Biopesticides

- More quantity of pesticide required due to its crude formulations.
- Mode of action is slow.
- Higher specificity and require an exact identification of the pest/pathogen.
- Variable efficacy

Conclusion:-

The widespread use of insecticides is ineffective and economically wasteful in the long run. Many insecticides do in fact accomplish the intended task of controlling pest populations. However, their detrimental health and environmental effects make them an inadequate long term solution. Thus the only viable solution for the future is biopesticides. The economic benefits and reduced social costs of biopesticides present a logical answer to the pest control problem. There have been growing interests in sustainable and organic



agriculture in developing countries because of the availability of natural inputs, human resources and agro-climatic conditions. There is a long-term regulation of a pest population in nature by beneficial organisms to keep pest populations below the threshold level. Though biopesticides possess several benefits, it is not well popularized due to lack of awareness among the farmers. It is necessary to convince farmers and government agencies to adopt biopesticides as a prime component of IPM.

