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Current Status of Biopesticides Over the Chemical Pesticides

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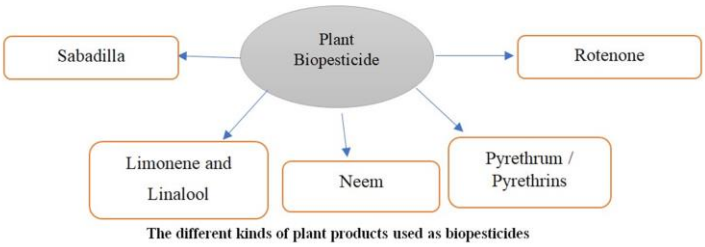
INTRODUCTION

Pesticides are substances that prevent pests from reproducing. Herbicides, insecticides, nematicides, bactericides, antimicrobial agent fungicides, and other pesticides will be discussed. Herbicides are the most popular type of pesticide, accounting for 80 percent of overall pesticide usage. The majority of pesticides are used to protect plant products (crop protection plants), which protect the plant from fungi, bacteria, viruses, and insects in general (GRACE, 2018). Chemical pesticides are another name for these pesticides. Chemical pesticides cause contamination and death in domestic animals, as well as the loss of natural pest antagonists and pesticide resistance. The death or demise of a plant has an impact on the soil's fertility.

Biopesticides are non-toxic, eco-friendly pesticides created by living organisms such as plants, animals, and microorganisms (viruses, bacteria, and fungi) to control and protect crops against harmful plant-damaging diseases (viruses, bacteria, insects, and so on). Biopesticides work in small amounts and leave no residue, which is a key worry for customers, especially when it comes to edible vegetables and fruits. The flowchart 1 depicts the many types of plant products used as biopesticides (Essiedu, et al., 2020).



The different kinds of plant products used as biopesticides

The productivity of biological and chemical pesticides on crops, vegetables, and fruits is the same when utilising biological pesticides as a source of pest control. Biopesticides have become more important as a result of their effectiveness, biodegradability, and lack of toxicity as compared to chemical pesticides.

Types of Biopesticides:

Biopesticides fall into four major categories:

(1) Microbial pesticides:

Microorganisms such as bacteria and fungus, as well as protozoa, are utilised as active ingredients in microbial pesticides for the biological control of plant diseases and pestiferous insects. Bacillus thuringiensis, an insect pathogenic bacterium, is the most extensively employed microbe in the production of biopesticides (Bt). During the spore production of B. thuringiensis, the bacteria create protein crystals or toxins, and the toxin protein is capable of lysis of gut cells when fed by certain or sensitive insects.

(2) Biochemical pesticides:

Natural pesticides, often known as herbal pesticides, are naturally occurring compounds that are used to manage pests in a non-toxic manner.

(3) Plant-Incorporated-Protectants (PIPs):

PIPs, also known as Genetically Modified Crops (GMC), are biopesticides created by plants using rDNA technology to synthesise genetic material (DNA). Bt Cotton is an example.

(4) Semiochemicals:

A semi chemical is a chemical signal produced by one organism, mainly insects, that causes an individual of the same or different species to change their behaviour.

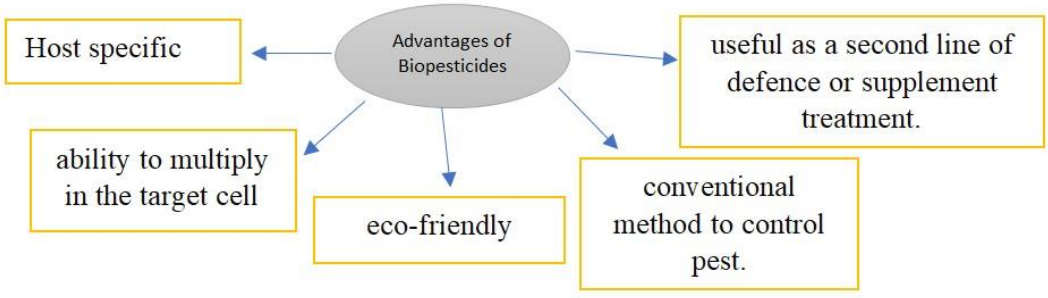
(5) RNAi pesticides: Some of them are timely, while others are absorbed by the crop (Tijjani et al. 2016).

Table 1: Differences between chemical and biopesticides

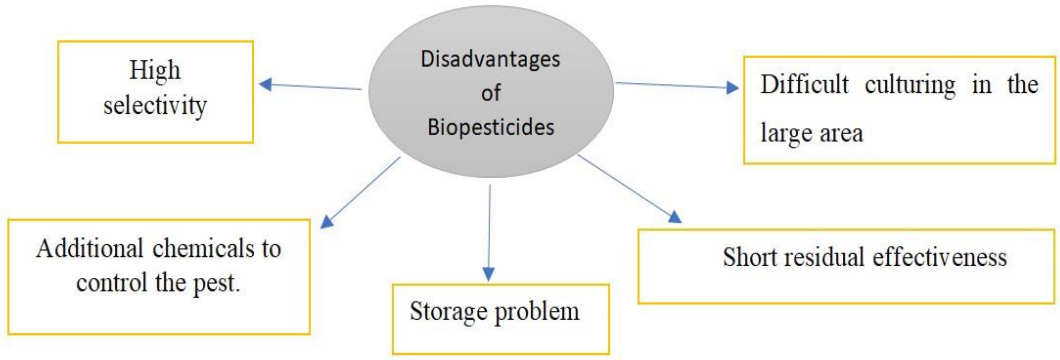
Chemical Pesticides	Biological Pesticides
Increased toxicity of beneficial insects to non-target pests, producing changes in biodiversity and disrupting natural ecological equilibrium.	Because biopesticides are non-toxic and non-pathogenic to non-target creatures, they have no effect on helpful animals such as predators or parasitosis.
Chemical pesticides leave chemical residues in food, either directly or by biomagnification, producing health concerns such as skin irritation, eye irritation, gastrointestinal pain, cancer, and so on.	Biopesticide residues are non-hazardous and safe at all times, including while crops are being harvested. Food, feed, and fibres contain no hazardous contaminants.
Overuse of chemical pesticides has resulted in insect resistance.	It is unlikely that pests will acquire resistance to biopesticides.
Control's nature: curative	Control is preventive in nature.
Rapid reduction in pest population	Reducing the pest population takes time.
Global market reduction	The international market is growing.
The global market is expanding.	Production costs are low.

Advantages of Biopesticides:

There are following advantages of Biopesticides.



Disadvantages of Pesticides:



Application of Biopesticides:

Delivery of products must be easy, economical, effective, timely to the appropriate site of action, and compatible with current agronomic practices and equipment. Formulated microbes can be delivered to seed, seed pieces, tubers cuttings seedlings, transplants mature plants, or soil, these application methods are:

1. Seed treatment:

For the protection of germinating seeds and seedlings against disease, the bio fungicides a type of biopesticides need to be delivered in a manner that allows the organism(s) to colonize the spermospere and the developing rhizosphere at a density that is high enough to suppress the pathogen (Gindrat, et al. 1979).

2. Soil treatment:

If seed treatment is not a practical option, e.g., if direct inoculation onto seed is harmful to the microbe due to desiccation, or the presence of inhibiting compounds. So, to overcome this problem some biopesticides (bio-control agents) can be applied to the soil. In greenhouse crops, we use bio-control agents to soil or growth medium is by direct injection (Thomashow, & Weller, 1990).

3. Genetically modified plants: -

Here, In Table Number 02 we describe some genetically modified plant species in which we used microorganisms to modify their genetic material and they act as Biopesticides.

Table 2: Examples of GMOs

S.No	Genetically Conferred Trait	Example	Genetics Changes
1	Herbicide tolerance	Soybean	Glyphosate herbicide (Roundup) tolerance conferred by expression of a glyphosate-tolerant form of the plant enzyme 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS) isolated from the soil bacterium *Agrobacterium tumefaciens*, strain CP4
2	Insect resistance	Corn	Resistance to insect pests, specifically the European corn borer, through the expression of the insecticidal protein Cry1Ab from *Bacillus thuringiensis*
3	Virus resistance	Plum	Resistance to plum pox virus conferred by insertion of a coat protein (CP) gene from the virus[7.]

CONCLUSION

In general, beneficial soil microorganisms are used in biopesticides. During the manufacture and application of biopesticide. We need to be educated on biopesticides and have a thorough understanding of them. The use of environmentally acceptable green solvents to create biologically based pesticides could be cost-effective, eliminate waste disposal issues, and increase market demand for biopesticides.

Biopesticides and organic bio-control solutions should be promoted as risk-free pest management options by researchers.

REFERENCES

"Pesticides in Our Food System". FoodPrint. GRACE Communications. Retrieved 26 March 2018.

Gilliom, Robert. "Pesticides in U.S. Streams and Groundwater." *Environmental Science and Technology* (2007), 3409-3414

Essiedu, J. A., Adepoju, F. O., & Ivantsova, M. N. (2020, December). Benefits and limitations in using biopesticides: A review. In *AIP Conference Proceedings* (Vol. 2313, No. 1, p. 080002). AIP Publishing LLC.

Tijjani, A., Bashir, K. A., Mohammed, I., Muhammad, A., Gambo, A., & Musa, H. (2016). Biopesticides for pests control: A review. *Journal of Biopesticides and Agriculture*, *3*(1), 6-13.

Gindrat, D. (1979). Biological of plant diseases by inoculation of fresh wounds, seeds and soil with antagonists. In:Soil-Borne Plant Pathogens (Eds. B. Schippers, and W.Grams). Academic, New York, pp.537-551

Thomashow, L.S. and Weller, D.M.(1990). Application of fluorescent pseudomonads to control root diseases of wheat and some mechanisms of disease suppression, In:Biological control of Soil-Borne Plant Pathogens (Ed.D.Hornby). Redwood, Melkshan Wiltshire, UK, pp.109-122

United States Department of Energy, Office of Biological and Environmental Research, Human Genome Program. Human Genome Project information: Genetically modified foods and organisms, (2007).