

Pest Control Through Biopesticides

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Introduction:

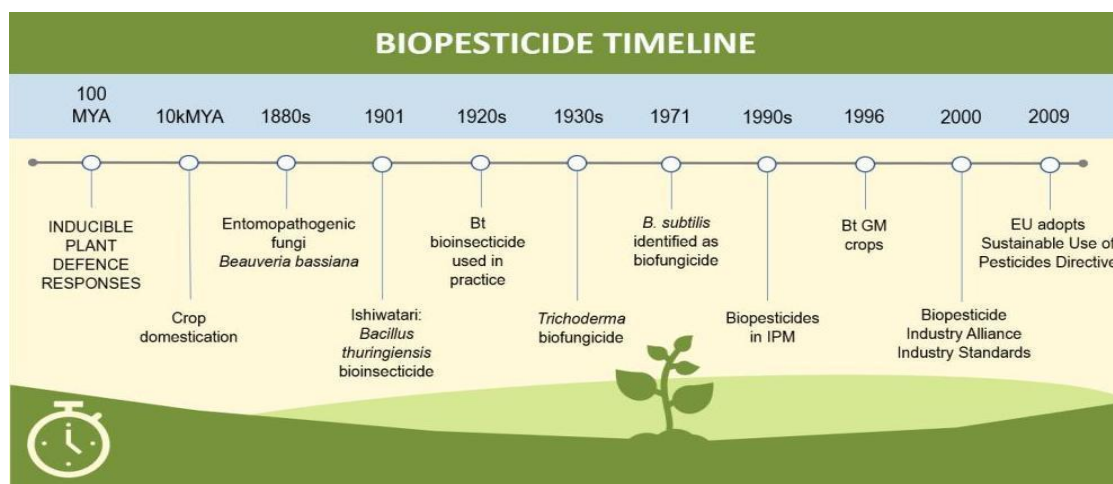
Biopesticides are the biological agents used to control the pest population. It includes the use of botanicals, microbial pathogens such as fungi, bacteria, viruses and natural enemies of pests such as parasitoids and predators, nematodes and semi-chemicals. The use of biopesticides in agriculture is fully aligned with market trends that promote healthy eating without neglecting environmental conservation. Consumers are increasingly demanding residue-free food. The trend is becoming more and more powerful.



- Usage of biopesticides prevents soil pollution and contamination from various chemicals like fluoroacetamide. They also have a lower chance of causing skin irritation in humans and animals.
- Chemical fertilizers have broad specificity, that is, they tend to kill a large population of pests but may also kill beneficial insects like pollinators. Biopesticides are specific for particular.

❖ **Timeline of Biopesticides:** About 100 million years ago, inducible plant defense responses came into existence and crop domestication was started. In 1880s, entopathogenic fungi- *Beauveria bassiana* was developed. In 1901, Ishitari: *Bacillus thuringiensis* came into existence, in 1920s, Bt bio-insecticide first used in practice.

In 1930s, Trichoderma bio-fungicide was developed and in 1971, *B. subtilis* was identified as bio-fungicide. The practical use of biopesticides in Integrated Pest Management (IPM) has started in 1990s. In 1996, Bt Genetically Modified (GM) crops were created. In 2000, a Biopesticide Industry Alliance Industry standard was set up. In 2009, EU (European Union)



adopted sustainable use of pesticide directive.

Biopesticides and their categories against various pests:

E.g.		ARTHROPODS	DISEASES	WEEDS	NEMATODES	MOLLUSKS
		Borers, defoliators, gall-makers, leaf-folder/rollers, miners, root feeders, skeletonizers, sucking pests, Webbers	Anthraco- se, blight, canker, damping off, dieback, gall, mildew, mold, rot, rust, smut, spot, wilt	Annual weeds, Biennial weeds, Perennial weeds	Bud and leaf nematodes, bulb and stem nematodes, burrowing nematodes, cyst, dagger, lesion, reinform, root knot, spiral nematodes, sting nematodes	Snails and slugs
Biopesticides	Bacteria	<i>Bacillus thuringiensis</i> , <i>Paenibacillus papillae</i> , <i>Burkholderia</i> <i>ojoensis</i> , <i>Chromobacterium</i> <i>subtsugae</i>	<i>Bacillus</i> <i>spp.</i> , <i>Pseudomonas</i> <i>spp.</i> , <i>Streptomyces</i> <i>spp.</i>	<i>Bacillus megaterium</i>	<i>Bacillus</i> spp., <i>Burkholderia cepacia</i>	-
	Fungi	<i>Beauveria bassiana</i> ,	<i>Aureobasidium</i>	<i>Collectotrichum</i> <i>gl</i>	<i>Myrotherium verrucaria</i> ,	-

		<i>Cordyceps fumosorosea</i>	<i>pullulans, Clonostachys rosea, Coniothyrium minitans, Muscadonea albus, Trichoderma spp., Ulocladium oudemansi</i>	<i>oesporioides</i>	<i>Pochoniachla mydosporia, Purpureocillium lilacium</i>	
Nematodes		<i>Heterorhabditis spp., Steinernema spp.</i>	-	-	-	<i>Phasmarhabditis maphroditica</i>
Viruses		Granuloviruses, nucleopolyhedroviruses	Bacteriophages	Tobacco mild green mosaic Tobamovirus	-	-
Botanicals		Azadirachtin, Essential oils and other oils, Pyrethrins, Terpenes, etc.	BLAD, Essential oils, Plant extracts	Essential oils	Azadirachtin, Terpenes	-

Toxins	Avermectins, Spider venom peptide, Spinosad	Ceravisane , Chitonsan, Srobulurin	-	Avermectins	Spinosad
Others	Diatomaceous earth, Mineral oil, Potassium salts of fatty acids	Acetic acid, Citric acid, Mineral, Mineral oil, Potassium salts of fatty acids	Acetic acid, Citric acid	-	Diatomac eous earth

Conclusion:**Advantages of biopesticides:**

1. Host specificity.
2. Ability to multiply in the target cells.
3. No problem of toxic residue.
4. No evidence or absence of resistance.
5. No problem of cross resistance.
6. Conventional technique or methods for applications.
7. Permanent control of pest or long persisting effect.
8. Ideally suited for integration with most other plant protection measures used in IPM programme.
9. No fear of environment pollution and hence eco-friendly.

Disadvantages of biopesticides:



1. High selectivity or host specificity.
2. Requirement of additional control measures.
3. The correct time of application.
4. Delayed effect or mortality.
5. Storage problem.
6. Difficulty of culturing in large quantities.
7. Short residual effectiveness.

