

Bacteriophages: Bacterial Bio-Control Agent

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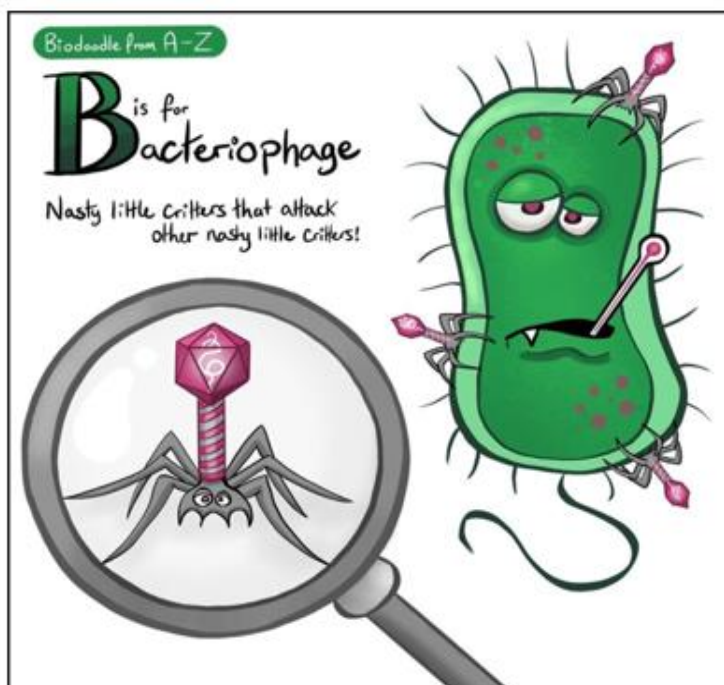
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ARTICLE ID: 10

Introduction

Bio control agents are the micro-organisms that control the growth of pest or pathogen causing diseases in plants. The bio control agents protect plants from their natural enemies like parasites from predation, etc. They help in controlling the infestation of plant pests such as weeds, nematodes, insects, and mites. The biological control agents are specific to harmful organisms and do not kill useful organisms present in the soil. Bio control agents can be either insect predators like spider, beetle, wasps etc. or can be pathogenic microorganisms like fungi, bacteria and virus.

Bacteriophages



“Bacteriophages are the viral microorganism that infects bacteria usually known as bacteria eater”

Bacteriophages are made up of proteins that enclose within the genetic material either DNA or RNA. Bacteriophages are classified according to their morphology and nucleic acid content. Bacteriophages are ubiquitous viruses found wherever the bacteria are present.

Phages may be tailed, icosahedral or filamentous shaped. Phage consists of a polyhedral head, a short collar and a helical tail. Head- The head consists of 2000 capsomeres with double-stranded DNA enclosed within. Tail- The tail consists of an inner hollow tube which is surrounded by a contractile sheath with 24 annular rings. The distal end consists of a basal plate with tail fibres at each corner. The bacteriophage attaches to the bacteria with the help of these tail fibres. Commonly used bacteriophages are T4, λ (Lamda) phage, M13 phage etc.

Life cycle of bacteriophage

Bacteriophages get adhered to the host bacterium using its tail fibre, and then translocate its genetic material into the bacterium. Phage replicates within the host bacterium. Based on the destination of the genetic material, a bacteriophage comes to either lytic or lysogenic cycles. In the case of a lytic cycle, a bacteriophage multiplies and lyses the host cell, while in the case of a lysogenic cycle, its genetic material is integrated into bacterial genomic DNA (gDNA).

Phage therapy to control pathogenic bacteria in soil-plant systems

Currently, two-layer plate method is extensively used to isolate functional phages from soil. Plaques form on the plate because of bacterial lysis by phages, large transparent plaques commonly consist of functional phages that can be selected and isolated by repetition of the two-layer plate method. After inoculation of phages to the soil, it goes and gets attached to bacteria, penetrates and transfers viral DNA into the host cell where it synthesizes and produces more viral progenies by causing lysis of bacterial cell.

Cons of bacteriophages

When only one phage is used, bacteria may develop resistance against it. So combination of phages can be used which decreases the phage-resistant bacterial populations in the soil.

Conclusion

Bacteriophages are freely available in the soil. Too much dependence on chemical pesticides for the disease control is harmful. Bacteriophages are the beneficial microorganisms that can be used as a biological control agent for the bacterium.