**Myconematicides**

Various studies have been made with fungal nematicides. Classcal nematode-trapping fungi belonging to the genera, *Arthrobotrys, Dactylaria, Dactylella and Monacrosporium* have been studied in trials to control nematode genera Meloidogyne, Heterodera and Rotylenchulus, attacking mostly vegetable crops. These nematodes cause cyst and root knot diseases in these plants. There have been some limitations in the use of classical nematophagous (trap-forming) fungi for the control of these nematodes. It is difficult to manage fungi so that periods of nematode migration and trap formation coincide. Another group of fungi, the soil fungi have been found more ideal nematicides. These are **opportunistic fungi** such as *Vertivillium chlamydosporium, Dactylella oviparasitica* and *Paecilomyces lilacinus* that also attack eggs and young females of cyst and root-knot nematodes. Of these *P. lilacinus* has attracted much attention as it is almost ubiquitous in tropical and subtropical soils.

**Mycoinsecticides**

The greatest commercial impacts of biocontrol agents have been made in the insecticide markets. The most successful biocontrol agent has so far been the insecticidal bacterium, *Bacillus thuringiensis*, whose sales in forestry, agriculture and public health went much higher. Viruses, bacteria and fungi have been used as microbial insecticides.

Fungal insecticides become most common and effective by means of control of insect pests in some countries, chiefly in ex-USSR. Products of the entomogenous fungi have been used for insects of field crops, forest trees as well as horticulture and vegetable crops grown in greenhouse. Several preparations have been produced, formulated and used commercially, chiefly in ex-USSR and developing countries like Brazil, Cuba and Israel. In western world fungal products have not yet been as successful as viral and *B.t.* insecticides. Different kinds of formulations have been developed and applied in different ways to insect pests. Though insect mycoses are caused by members of every class of fungi, most studies on entomogenous fungi have been concerned with species of the genera, *Aschersonia, Beauveria, Metarrhizium, Verticillium, Hirsutella, Coelomomyces and Entomophthora*. Some fungal insecticides are listed below

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| --- | --- | --- |
| Sl. No. | Insect pest | Fungus  |
| 1 | Glasshouse whitefly of many crops | *Aschersonia aleyrodis* |
| 2 | Colorado potato beetle, coding moth Pine caterpillar, green leaf hopper, European corn borer | *Beauveriabassiana* |
| 3 | Rice black bug aphid | *Entomophthora sphaerosperma* |
| 4 | Spittle bug of sugarcane, Coconut pest, Pasture cockchafer, black vine weevil | *Metarrhiziumanisopliae* |
| 5 | Aphids and white fly of glasshouse crops | *Verticilliumlecanii* |

Mycofungicides

Mycofungicides have been promoted for agricultural use because of their ability to control plant diseases and their ability to increase crop production in an environmentally friendly manner. In recent years several mycofungicides have been patented and registered for plant disease control. Several effective mycofungicides have been formulated for commercial production. Formulation of mycofungicides includes wettable powders and granules; these being applied to seeds, seedlings and mature plants. Examples are Ketomium, formulated from *Chaetomium globosum* and *Ch. cupreum*, Promote formulated from *Trichoderma harzianum* and *T. viride*, Soil Gard formulated from *Gliocladium virens*, and Trichodex from *T. harzianum*.

Microbial antagonists can suppress plant diseases and organisms that suppress pathogens can be referred to as biological control agents (BCA). Various fungal species can be used as biological control agents and may provide effective activity against various pathogenic microorganisms. Examples are *Trichoderma harzianum* - a species with biocontrol potential against *Botrytis cineria*, *Fusarium*, *Pythium* and *Rhizoctonia*; *Ampelomyces quisqualis*, - a hyperparasite of powdery mildew; *Chaetomium globosum* and *C. cupreum*, - having biocontrol activity against root rot disease caused by *Fusarium*, *Phytophthora* and *Pythium*; *Gliocladium virens* - effective biocontrol of soil borne pathogens; *Coniothyrium minitans* - a mycoparasite of *Sclerotinia*; and *Fusarium oxysporum* (nonpathogenic species) - having biocontrol potential against *Fusarium oxysporum*. An effective biological control agent should be genetically stable, effective at low concentrations, easy to mass produce in culture on inexpensive media, and be effective against a wide range of pathogens. The fungal biological control agent should also occur in an easily distributed form, be non-toxic to humans, have resistance to pesticides, be compatible with other treatments, and be non-pathogenic against the host plant. Several fungal taxa have been reported to be antagonist against plant pathogens and have been successfully formulated as mycofungicides or biological control products e.g. *Ampelomyces quisqualis, Aspergillus niger, Candida oleophila, Chaetomium cupreum, Ch. globosum, Coniohyrium minitans, Cryptococcus* *albidus, Gliocladium virens, G. catenulatum, Fusarium oxysporum, Phlebiosis gigantean, Pythium oligandrum, Rhodotorula glutinis, Trichoderma harzianum, T. polysporum, T. viride*.