**Commentary**
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# Biofugicide for a Green Agricultural Production

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## Commentary

Biofungicdes are live organism formulations that are used to limit the activities of fungus and bacteria that cause plant disease. Biofungicides are based on studies of natural processes in which helpful microorganisms, usually extracted from soil, prevent plant diseases from reproducing. Free-living fungus, bacteria, or actinomycetes that are active in root, soil, and foliar habitats are known as biocontrol microorganisms. These microorganisms generate a variety of antibiotics, parasitize other fungi, compete with other fungus, and cause localised or systemic plant resistance. Another example of this disease management method is the use of composts and suppressive growth media, both of which include living microorganisms.

Biofungicides are effective against a wide range of fungi and water moulds, yet each active ingredient is only effective against a specific disease. Some are also used to treat bacterial infections. Almost all of the organisms used in biofungicides on the market today are found naturally in soil or on plant surfaces, and the majority of them are permitted for use in organic farming. Advances in fermentation technology have made it possible to mass-produce extremely specialised microorganisms that could previously only be cultured in tiny batches on highly particular substrates, such as pathogen-infected roots.

To target only one or a few specific pests, most biofungicides employ one or more of the processes described above. As a result, applicators should carefully study the label as well as identify the condition to ensure that the product will work. When used as a preventative measure, biofungicides are most effective. Although application after a plant has already been infected has a small possibility of changing the course of the disease for that plant, it may reduce the pathogen's capacity to spread to other plants, especially if the virus must travel through the soil. As a result, while a biofungicide application is unlikely to heal a diseased plant, it may provide protection to other plants in the field.

Biofungicides will never be able to replace good cultural practises. They are an important tool for maintaining the health of a powerful plant, but they cannot prevent the inevitable. If your client's Japanese maples are drowned, allowed to wilt, and then drowned again, a biofungicide will not protect them from developing Phytophthora if the disease is present in the soil. Why aren't biofungicides utilised more widely in the landscape if they're an effective and environmentally benign tool? Because these fungicides rely on living organisms for their efficiency, they must be properly preserved to maintain their fungicidal characteristics over time. However, one of the most frequently reported reasons is that the personal protective equipment required to apply them is more complicated than that required for other compounds. The proteins present in the spray mists of some biofungicides can cause allergic reactions when exposed to them on a regular basis. When mixing, loading, or applying biofungicides in agricultural or landscape environments, commercial applicators must wear NIOSH-approved respirators.

### Greenhouse production biofungicides

Commercial formulations of Trichoderma species and the closely related *Gliocladium* species include Plant Shield, Root Shield, PreStop, SoilGard, Asperello T-34, and T-22 PlanterBox. Trichoderma species are the well-studied of all biocontrol organisms. These species can also be found in a variety of composts and are the most commonly isolated soil fungi from temperate and tropical soils. Antibiotic synthesis by these species is widely known. Trichoderma species are highly resistant to a variety of poisons and antibiotics produced by soil microbes, antimicrobial compounds produced by plants, and even chemical fungicides. As a result, these fungi are active colonisers of toxic settings as well as a formidable competitor.

### How to use biofungicides

Biofungicides can be equally successful as chemical fungicides in the greenhouse industry when applied to growth media or as a seed treatment for root and crown disease prevention. Biofungicides used to treat foliar diseases must be utilised in a proactive manner. Biofungicides are generally safer for growers, can last longer, and are sometimes less expensive than traditional fungicides.

The most effective use of biofungicides is as a preventive treatment in growing media or as a seed treatment. They should be mixed into the growing media prior to planting or applied as a drench immediately after transplanting; making sure that the entire soil volume is treated. For foliar applications, the biofungicides must be in place before pathogen infection as their action is purely protective. They must be reapplied frequently both to protect new growth and to ensure that effective populations of the microorganisms are present. Because biofungicides consist of living organisms, they may have different storage, shelf life, and handling requirements than conventional fungicides. Most biofungicides have short reentry intervals (0-4 hours).

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