Insect-killing Fungi and Marigolds Team up to Guard your Ornamentals from Western Flower Thrips

Western flower thrips (WFT) remains a serious pest of greenhouse ornamentals. They feed on many plant species, causing cosmetic damage and transmitting viral diseases. Early detection is critical to successful management, but they are hard to see because they are tiny and hide in plant crevices. They pupate in the soil, where they are often overlooked for management. Chemical pesticides are just not working well enough due to resistance. Biological control in combination with good cultural practices is the only hope. Release of natural enemies is expensive and can be insufficient to suppress WFT populations, which increase quickly when conditions are right. We have developed a marigold guardian plant system using a do-it-yourself millet-based granular formulation of Beauveria bassiana, an insect-killing fungus, to enhance fungal persistence in potting soil to target WFT when they enter the soil to pupate.

How do marigold guardian plants work? We found that marigolds (var. Hero Yellow) are very attractive to WFT (Fig. 1). They are ideal as guardian plants because they are easy to grow and bloom within 1 month. When in flower these are ideal traps for WFT in the early spring before bedding plants begin to bloom. WFT are often found 2 weeks earlier on marigolds than on yellow sticky cards. That is why many growers now use them as an early detection tool. Marigolds can also lure WFT out of the crop plants, where they can be managed with various biological control agents. If thrips populations can be reduced early in the season, they may not become a serious problem later.

There just isn’t enough TIME or MONEY! These days, growers are busier than ever. They don’t have time to scout their crops as often as they should or release natural enemies regularly. The high cost of shipping natural enemies limits their use for some smaller growers. Growers prefer systems that are effective at keeping thrips at bay, but don’t require a lot of attention.

Fungi and Marigolds: A Winning Team. We have found that a millet-based granular formulation of Beauveria bassiana, (the isolate in BotaniGard® products) when mixed into the top layer of the potting soil, keeps WFT populations below damaging levels for at least 12 weeks. Thrips lay their eggs in plant stems and leaf tissue. The eggs hatch in 2-4 days and the larvae feed on flowers, leaves and pollen. After 4-6 days they drop to the soil and burrow down an inch or two where they pupate. In the meantime, B. bassiana grows in the soil, producing a
fungal mat. The immature thrips come in contact with fungal spores as they seek a suitable place to pupate. They become infected and die in the soil, or emerge from the soil as infected adults and die within a few days. Granular formulations of *B. bassiana* are not commercially available, so we have been testing simple ways to enhance the effectiveness of this fungus in the soil.

**How Does it Work?** Millet, a small round grain, is cooked, dried, and mixed into the top layer of potting soil. A BotaniGard® WP drench is then made to the soil. Tests were run comparing the number of spores in the soil following a BotaniGard® WP drench with and without millet. After 1 month, the spore concentration in soil of pots treated with millet/fungal drench was over 3.5 times greater than in those treated with a fungal drench without millet. The fungus could be seen growing around the millet grains on the surface of the potting soil (Fig. 2). After 2.5 months, spore counts were still higher in the pots with millet. Preliminary results also showed that when thrips were added to the pots, significantly fewer emerged from soil containing millet and drenched with BotaniGard® than untreated potting mix. Trials are planned to test marigold guardian plants in commercial greenhouses in the future (Fig. 3). When used together with other integrated pest management tools, marigold guardian plants could contribute to minimizing the impact of WFT on ornamentals.

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