

## **Magnificent Marigolds and Awesome Alyssum: PLANT-MEDIATED SYSTEMS IN HIGH TUNNELS**

These days most vegetable growers in the Northeast and Mid-Atlantic states have one or more high tunnels. These are rudimentary hoop houses covered with one or two layers of plastic, vented with roll-up sides for cooling in warm weather, and often lacking electricity or heating. These have become essential for producing vegetables as weather conditions become more extreme and less predictable. They allow growers to extend their vegetable growing season, protect their crops from adverse weather and supply crops early to maximize on the market. Plant production is a balancing act. Growers must create conditions that favor the crop, but these often encourage pest survival. High tunnels present unique pest management challenges, and effective Integrated Pest Management (IPM) strategies in these structures are lacking. Scientists from the Univ. of Vermont have assessed several plant-mediated systems to reduce pest populations and crop damage by attracting and supporting populations of both natural enemies and pollinators.

**Plant-mediated IPM Systems** use plants to attract natural enemies and pollinators to sustain biological control and promote crop quality. Two particularly effective plants are marigolds and *Alyssum* (Fig. 1). Our research has shown that they attract a wide assortment of parasitic wasps, syrphid flies, and *Orius* (Fig. 2). Parasitic wasps lay their eggs in the pest and their larvae consume the pest from the inside out; syrphids are bee mimics that are both pollinators as adults and predators of aphids as immatures; and *Orius*, AKA minute pirate bugs, are predators of thrips, aphids and other soft-bodied pests.



**Fig. 1.** Flowering *Alyssum* grown under tomatoes and marigold (Hero yellow) and sticky card positioned among seedling tomatoes.

These plants are trap/indicator plants, luring pests out of the crop and serving as an early detection tool. Hero yellow marigolds have been shown to detect pests earlier than yellow sticky cards, a standard monitoring tool. Growers can reduce their scouting time by checking the marigolds rather than the entire crop.

*Alyssum* offers an ideal habitat for natural enemies. They produce pollen and/or nectar as a food source for beneficials in the absence of prey. They also provide shelter and places for natural enemies can reproduce and complete development. As populations of beneficials increase, they move into the crop searching for prey. This ensures a continual supply of natural enemies to keep pest numbers low. Ideally these plant-mediated systems should be placed in the production area when they are blooming and before the crop is added. Resident pests are attracted to them rather than to the crop. If the pest population builds up too high on these plants, they can be bagged and destroyed before the pests move out into to the crop. These plant systems are a simple and inexpensive way to support natural enemy and pollinator populations, getting them established early. Growers who release natural enemies in their high tunnels often put them on these plants to ensure there's a food source if there are no pests in the crop. Many growers now routinely plant clumps of a

combination of *Alyssum* and marigolds at the ends of each row of tomatoes. Natural enemies and pollinators from outside the high tunnel are also attracted to these plants adding a free source of beneficials. Once a system is set up, they can provide fresh biocontrols throughout the season, eliminating the need for frequent reordering from commercial biocontrol suppliers, proving that the Best Things in Life are Free!



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**Fig. 2.** Parasitic wasp and a tomato hornworm attacked by wasps (top); syrphid fly adult and larva feeding on aphids; adult *Orius* (bottom).

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