



Plant-Mediated IPM Systems Explained

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Indicator Plants

It is known that some plants are more attractive to pests than others. They can be used as indicator or sentinel plants to detect pests or diseases early. Growers can use them to scout for pests quickly without having to check the whole crop. If the pest is found on an indicator plant, a grower will need to inspect nearby susceptible crop plants to determine if a management action is needed. Some examples of indicator plants are eggplants for whiteflies (Fig. 1), marigolds for thrips, and petunia for INSV/TSWV. Indicator plants can also be used to check for natural enemies, which often follow the pests. Care must be taken when using indicator plants to ensure they don't become a source for a pest outbreak. Indicator plants should be monitored regularly to ensure pest populations are not getting too high.



Fig. 1. Eggplant indicator plant for whiteflies in poinsettias.

Trap Plants

Trap plants are similar to indicator plants. They draw the pest out of the crop, but also can be a targeted site for growers to make a spot pesticide treatment or release beneficials. This eliminates the need to treat the entire crop. Alternatively, if the trap plant becomes heavily infested, it can be bagged and removed from the greenhouse to eliminate the pests. Some examples of indicator plants are yellow marigolds, mums or gerberas for thrips in ornamentals and bush beans for spider mites in tomatoes (Fig. 2).



Fig. 2. Bean trap plant for spider mites.



Fig. 2. Barley banker plant to support wasp parasitoids for aphid control.

Banker Plants

Banker plants are mini-rearing systems for natural enemies. There are two basic types of banker systems. One type supplies a nutrition source for the pest, such as prey or food (pollen, nectar, etc.). This system provides a continual supply of natural enemies that disperse into the crop looking for the target pest. The prey insects do not damage the crop. For example, papaya whiteflies do not threaten greenhouse ornamentals, but will sustain whitefly parasitoids on papaya banker plants. Bird cherry oat aphids, a cereal grass pest that doesn't attack greenhouse bedding plants, can be reared on barley banker plants to sustain parasites that are oftentimes used against green peach and melon aphid (Fig. 2). The second type of banker plant is a bit more risky. It uses the target pest as a host for the natural enemy. For example, beans attract and maintain pest spider mites, but can be used to rear spider mite predators; ornamental peppers attract thrips to sustain the thrips predator *Orius*, but also provides pollen for the predator in the absence of thrips.



Fig. 3. Habitat basket of ornamental pepper and lobularia used to sustain the thrips predator *Orius*.

Habitat/Insectary Plants

Habitat plants are pots of pollen-producing flowering varieties that are highly attractive to natural enemies and many pest species. These plants provide food (pollen, nectar or pests) and shelter for natural enemies, and a place for them to lay eggs. They attract and sustain naturally-occurring beneficials and are ideal sites for releasing commercially-produced natural enemies. When natural enemy populations are high, they disperse into the crop in search of additional pests. Examples include hanging baskets of lobularia/alyssum and ornamental peppers to attract *Orius* predators and combat thrips (Fig. 3). Habitat planters combining fennel, dill or marigolds effectively attract hover flies (the larvae feed on aphids and other soft-bodied insects); lantana and eggplant attract whiteflies to sustain their parasitoids (*Encarsia* spp., etc.)

Guardian Plants

Guardian plants combine multiple interactions between plants, pests and their natural enemies. They attract the pest and beneficials and thus are a place to monitor for pests and assess natural enemy effectiveness. They provide a sustained food source which ensures the survival of natural enemies. All together they serve as a 'guardian' over the crop. For example, marigolds are being tested as a guardian plant for bedding plants. They are highly attractive to thrips and thus serve as an indicator plant drawing them out of the crop (Fig. 4). When predatory mites are released on the foliage and entomopathogenic fungi to the soil, the marigolds serve as a trap plant where thrips are attracted and killed. Because marigolds provide a source of pollen and thrips for the predatory mites they are a habitat/banker plant, enhancing mite survival and reproduction.

Supporting Information

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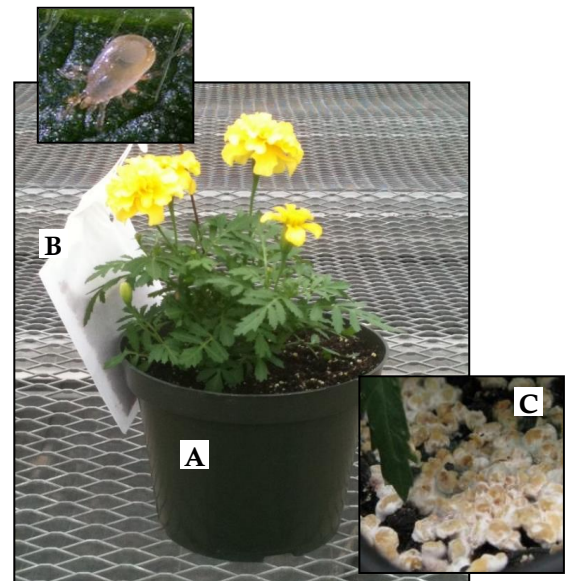


Fig. 4. Marigold guardian plant; A = marigold plant; B = predatory mite released on marigold foliage to feed on thrips larvae; C = granules of insect-killing fungi sprinkled in pot to kill thrips in the soil.

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