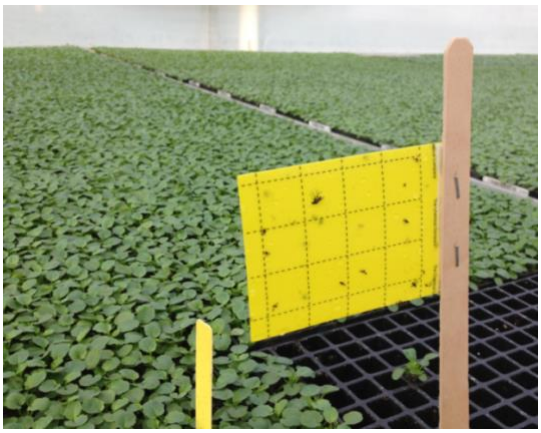
BALLTECH ON DEMAND™

IPM TOOLBOX: SETTING THRESHOLDS & MONITORING

Prevention is not the same as exclusion. Exclusion focuses on keeping pests and diseases from entering in the first place, whereas prevention relies on setting thresholds, regimented detection efforts and quick reaction once a malicious organism is identified in the greenhouse.



Start With Thresholds

We use the term "clean culture" frequently when discussing greenhouse IPM, but it's virtually impossible to have 100% pest- and disease-free crops. It's important to understand this or you will likely spend way more on manhours and pesticides than necessary to keep crops in good health. Thresholds should be proportional to the cost of managing the pest or disease in question—the economic injury level. Set tolerances for pests and diseases based on risk and severity and develop appropriate action plans for each threshold to avoid over- or undermanagement.

I'll use powdery mildew management as an example for how to set and act upon thresholds.

- Under low-pressure scenarios, powdery mildew can cause minor damage to foliage and flowers, but plants often recover quickly if greenhouse parameters are changed to make a less-favorable environment for disease. An appropriate level 1 threshold for scattered, early signs of disease could include an increase in air flow or venting, modified watering practices to reduce relative humidity or increased spacing between plants.
- Moderate infestations can cause discoloration or noticeable damage to infected tissues, but plants can often recover if cultural and environmental factors are modified, and a fungicide is applied to reduce spread to healthy plants. If unmanaged, crops may need to be grown out for longer, which would increase the cost of production and reduce

profit margin. An appropriate level 2 threshold could include a continuation of level 1 efforts and use of a "soft" fungicide like a potassium bicarbonate product to curb the spread.

- Heavily infested plants may incur unrecoverable damage and crops may become stunted or susceptible to other pathogens in the greenhouse. If management efforts are not stepped up, significant crop losses can occur, crop time may increase to an unsustainable level and labor hours and other inputs needed to turn the crop around may become prohibitive. Level 3 management could include removal of heavily infested plants to quickly reduce sources of fungal spores in the greenhouse and use of a harder-hitting fungicide chemistry to remediate disease, in addition to level 2 and 1 measures.
- Thresholds cannot be applied universally to all crops and pests or diseases. The greater the risk of crop loss or cross-contamination into adjacent production areas, the lower the management thresholds need to be. Also, ensure that management steps at each level are appropriate based on the life cycle and basic biology of the pest or disease in question. If you are unsure of how to develop thresholds or appropriate management strategies for unfamiliar pests and diseases, reach out to a local extension agent or technical specialist for help.

Robust Monitoring

Thresholds are critical components of IPM, but they're nothing without a robust monitoring strategy. If you don't detect a pest or disease at or before your level 1 threshold, how are you supposed to prevent it from getting a foothold and causing more damage—right? It's easy to say that you should, "monitor crops regularly," but execution is not always that simple. Here are a few things to consider to make scouting more effective and actionable:

- **Commit.** Crops should be scouted daily around the same time, ideally sometime in the late morning once the sun has fully risen. Most pests are actively feeding or moving around and easier to spot once the sun is fully up but can become less active as the day continues, especially if temperatures are above optimal. Also, it is easiest to see disease signs and symptoms when light is ample but diffused throughout the greenhouse. If you're an owner/grower/operator and your time to walk crops is limited, scout every other day at the bare minimum.
- **Give ownership.** Put someone (or a team) in charge of pest and disease scouting and make them accountable for keeping the team apprised of changes in the greenhouse. This helps ensure that everyone involved with growing crops is on the same page regarding new and ongoing risks to crop quality and that appropriate actions are being taken based on thresholds.
- **Record.** Don't just go out into the greenhouse and look for pests and diseases. *Write down what you find and maintain continuous records.* Whether you keep a written log or maintain a spreadsheet on your computer, record bug counts of key pests from sticky cards and disease symptoms and signs while scouting. Be sure to collect specifics like

the crop species, cultivar, greenhouse/bench location, distribution in the growing area, and a detailed description of the pest/symptoms. Take high-quality photos, as well, and appropriately label and catalog them to assist with identification in case you need to consult a specialist.

- **Evaluate.** As the saying goes, "what gets measured gets improved," and this holds especially true for IPM. For example, going back to the powdery mildew example above, if you spray a fungicide after hitting your level 2 threshold, how effective was the application? If about 50% of the crop was showing symptoms before spraying, what proportion of the crop is showing symptoms later that week? Quantify the change in pest population or disease severity to determine whether control measures have truly been effective or if the next level of management needs to be taken.