

Releasing Natural Enemies

for Pest Management on Urban Farms

Mimicking the natural world can be an effective approach in sustainable pest management. We can use the good bugs to manage the bad bugs! Many insect and mite pests have natural enemies that can be purchased and released on the farm to help reduce pest populations. The trick is knowing what the right natural enemy is to release at the right time and in the right place. In our experience, this approach works best in enclosed systems, such as greenhouses, high tunnels, and under row cover, to help prevent the natural enemy from dispersing. This fact sheet is based on our experiences releasing natural enemies for pest management on urban farms in New York.

There are a few different categories of natural enemies (adapted from Cornell [biocontrol resources](#)):

- **Predators** – These types of enemies directly kill and eat the pest. (ex. lady beetles, minute pirate bugs).
- **Parasitoids (parasites)** – These have an immature life stage (eggs or larvae) that develops on or within an insect host, ultimately killing the host. Adult parasitoids are free-living and may be predaceous. Often the host/parasite relationship is very specific (e.g. parasitoid wasp *Aphidius colemani* specializes in parasitizing aphids).
- **Pathogens** – These are disease-causing microbes (bacteria, fungi, virus, nematode) that infect their host. Commercially available formulations of pathogens are referred to as biopesticides. These materials are regulated as pesticides.



Lady beetle adults (left) and larva (right) on the prowl for aphids in a collaborating urban farm greenhouse. Correct pest identification is critical! Know your target pest and the natural enemy's life cycles. For example, sometimes larva is the only predatory stage (ex. aphid predatory midge) and sometimes both larvae and adults are predatory (ex. lady beetles). Photos: Lori Koenick, Cornell Vegetable Program

Specialists or Generalists

Natural enemies can be specialists or generalists. Specialists attack a narrower range of pests than generalists and depend on a specific food source (typically the target pest) to survive. Generalists are usually able to survive in the absence of the target pest having a broader diet that can include other insects and other substances such as pollen.

Use as a Short-Term or Long-term Pest Management Approach

Natural enemies can be used as a short-term or long-term approach depending on the species and environmental conditions. Releasing multiple types of natural enemies can give us both quick pest reduction, and long-term management potential. For example, in an urban greenhouse growing mixed vegetables, we noticed aphid numbers building early in the summer season. Lacewing larvae (*Chrysoperla rufilabris*) were released twice early in the season to be **used as a quick knockdown of the aphid population**. Afterwards, aphid predatory midge (*Aphidoletes aphidimyza*) was released weekly over a period of six weeks as a **more sustained biocontrol approach** throughout the season, as they reproduce and maintain population throughout the season.



An *Aphidoletes aphidimyza* larva (orange arrow), aphids (red arrow) and aphid mummies (blue arrow) seen under a 10x hand lens on a leaf. Photo: Lori Koenick, Cornell Vegetable Program

Steps to Success Using Natural Enemies

Releasing natural enemies works best when used as a preventative approach when pest populations are low. We recommend **releasing early** in the season, **using multiple and consistent releases** throughout the season, and **using in combination with multiple strategies** such as good cultural control practices.

When releasing natural enemies, it's best to follow these steps:

1. **Scout often** – Check your crops regularly for any pest, disease, and cultural problems.
2. **Correct pest identification** – It is critical to know the specific pest species and stage of life cycle when making management decisions. For some natural enemies and their target pests, you need to match up their life cycles.
3. **Do your research!** Natural enemies are alive – most have a short shelf life and require specific storage conditions. Learn the environmental conditions (temperature, humidity) for your natural enemy to thrive. Many pesticides (including spray residue) can harm and kill natural enemies. Biocontrol providers are an excellent resource of this information.
4. **Release the natural enemy. Things to consider:**
 - **Timing** – Should you avoid direct sunlight? Does it need to be done at night?
 - **Environmental conditions** – What are needed? For example, when releasing entomopathogenic nematodes in the soil, should you water the soil beforehand?
 - **Placement** – Should you release the natural enemy right next to the pest or put it in a more central location? Should you sprinkle it right on the leaves or place the container on the ground? How the natural enemies are packaged can influence placement. Again, biocontrol providers can be a great resource for this information.
5. **Monitor progress** – Check to see how long the natural enemy is active and know what success should look like with the specific natural enemy used (e.g., mummified aphids, reduction in pest numbers, etc.). When monitoring, note if pest pressure and damage are less. Consider if you need to do another release or incorporate another pest management tactic.

Resources

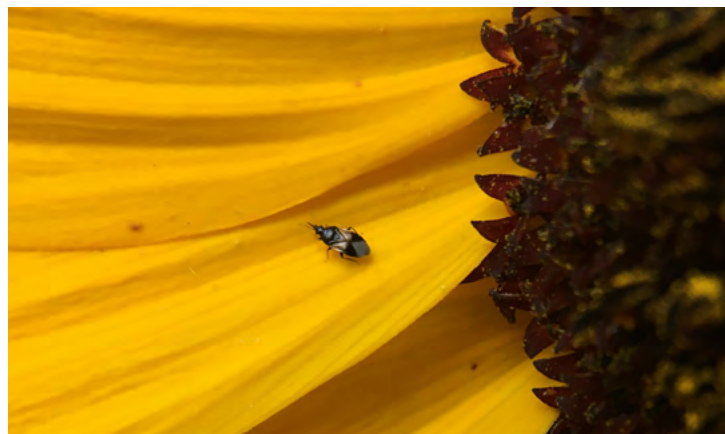
[Biocontrol](#) – Cornell New York State Integrated Pest Management; especially the [How to Use Biocontrol](#) and [Biocontrol Agents](#) sections

[Aphid Management in Winter Tunnel Greens Fact Sheet](#) – CCE Cornell Vegetable Program

Pocket Guide to Beneficial Insects (available in [English](#) and [Spanish](#)) – CCE Harvest NY and NYSIPM

[Field Guide: Arthropod Pests of NYC Vegetables](#) – CCE Harvest NY and NYSIPM

CCE Harvest NY [“Urban Growing” playlist](#). YouTube



Minute pirate bug adult on a flower. A collaborating urban farmer reported healthier plants, less money having to be spent on pest control products, and saving up to 3 hours a week during the growing season on pest management in the greenhouse due to releasing natural enemies. Photo: Amara Dunn-Silver, NYS IPM

Interested in Learning More?

Contact project team members Sam Anderson (swa39@cornell.edu) of CCE Harvest NY, Lori Koenick (lbk75@cornell.edu) or Judson Reid (jer11@cornell.edu) of the CCE Cornell Vegetable Program.

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