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Let *Beneficial* *Insects* Work for You

by TIMOTHY ABBEY

Integrated pest management programs that use beneficial insects can reduce landscape pests in an environmentally safe way.

Insects are everywhere. Any given landscape can literally contain hundreds of species. Luckily, most of these insects are not pests, meaning they do not damage plants or pose a threat to human health. However, there are the ones that do feed on ornamentals, causing aesthetic damage and/or plant death. Obviously, these insects require attention. A well-designed integrated pest management (IPM) program is the most effective way of dealing with these pests.

One tool in the IPM arsenal is natural enemies. These include predatory and parasitic insects and microorganisms, such as insect-pathogenic nematodes, bacteria (*Bacillus thuringiensis*; Bt), fungi (*Beauveria bassiana*) and viruses (nuclear polyhedrosis virus). The focus of this article is on beneficial insects and their role in landscape pest management.

There are numerous beneficials that can inhabit ornamental landscape plants. Some of them, such as spiders, are generalists that feed on any insect that can be caught, including other predators or beneficial pollinators. It is the sign of a healthy

landscape to have spiders and other non-specific predators present, but specialist feeders, such as the twice-stabbed lady beetle that feeds on scale crawlers, are more likely to impact the population of plant-feeding pests.

Why should beneficial insects matter to you? Numerous studies have documented the effectiveness of specific beneficial species against certain plant-feeding pests (see the article, "Natural Enemies to the Rescue," in the Sept. 1, 2007, issue of AMERICAN NURSERYMAN for a recent example). It makes sense to maximize the impact these naturally occurring "workers" have on your clients' properties or in the nursery. Also, they are important for resistance management — overspraying year after year with one insecticide, miticide or class of materials can lead to resistant pest populations. This is not an issue when predators and parasites take care of damaging insects.

Business incentives. Another reason to focus on beneficials is the recent changes in legislation that have started to regulate pesticide applications on ornamental plants and turf areas. No matter whether you are pro or con on this issue, it may impact your business in the future. A number of municipalities in Canada banned "cosmetic pesticide uses" — applications based solely on aesthetic purposes — in 2004. Connecticut has enacted a law that phases out pesticide applications on public and private school grounds. Some towns in Massachusetts and New Jersey do not allow applications on town property. Naturally occurring beneficial insects are not going to be regulated locally or federally. Unlike pesticides, beneficials are exempt from EPA registration and are an organic method of pest control.

The beneficial insects that inhabit the landscape can play a major role in successful management of certain ornamental plant insect pests.

A final reason to integrate beneficial insects into your IPM practices is that their use can be promoted in your company marketing. Field technicians can be trained to identify commonly encountered beneficial insects and then select pesticides that minimize the negative impacts on their survival. This is a level of professionalism that educated consumers want demonstrated on their properties. Companies can also market that beneficial insects can be purchased and released for clients who desire a pesticide-free option. It needs to be communicated clearly to the homeowner that beneficial insects typically work slower than pesticides and, depending on the species released, may not stay on the property.

Identifying and employing beneficials. Maybe you have been thinking about incorporating beneficials into your IPM program, but lack the resources to identify the "good guys." It is extremely important to learn how to correctly identify all life stages of the most common beneficial insects. For some predators, the immature and pupal stages look nothing like the adults. Lady beetles are a great example. Incorrectly identifying one of the life stages of a beneficial insect as a plant pest, then applying an insecticide,



The orb-weaver spider is a generalist predator.



Learn to recognize all life stages of common beneficial insects, such as this overwintering egg mass of a praying mantis.

negates the positive impact the beneficial has in that landscape. There are a number of valuable publications and Web sites that can help with identification (see sidebar, page 22).

Once a commitment has been made to incorporate beneficials into the IPM program, strategies have to be worked out as to how and when this option would be most effective. Three avenues can be ex-

plored: augmentation, conservation and landscape design.

Augmentation: Augmentation is the purchase and release of predatory or parasitic insects. This has proved to be an effective option and has been adopted for some pests in closed greenhouse systems. In landscapes, adoption has been slower because the cost is often an obstacle. A majority of homeowners are just not will-

Beneficial insect resources

Biological Control Information Center
(North Carolina State University),
[http://cipm.ncsu.edu/ent/biocontrol/
application.htm](http://cipm.ncsu.edu/ent/biocontrol/application.htm).

Gardiner, M.; C. DiFonzo; M. Brewer; and
T. Noma. 2006. *Identifying Natural
Enemies in Crops and Landscapes*.
Extension Bulletin E-2949, Michigan
State University.

Integrated Pest Management Resources
(Michigan State University), [www.ipm.
msu.edu/natural-enemies.htm](http://www.ipm.
msu.edu/natural-enemies.htm).

Jeffords, M.R.; S.L. Post; R.N. Wiedenmann;
C. Nixon; and C.S. Sadof. 1997. *The
Good Guys! Natural Enemies of Insects*.
Illinois Natural History Survey and
Purdue University.

Mahr, D.L., and N.M. Ridgway. 1993.
*Biological Control of Insects and
Mites: An Introduction to Beneficial
Natural Enemies and Their Use in
Pest Management*. University of
Wisconsin-Madison.

Raupp, M.J.; R.G. Van Driesche; and J.A.
Davidson. 1993. *Biological Control
of Insect and Mite Pests of Woody
Landscape Plants: Concepts, Agents
and Methods*. University of Maryland.



An adult hover fly is feeding on *Rosa palustris* (swamp rose). Hover fly larvae are great aphid predators.

because of their short residual, have less impact on the beneficials that may currently be present or that move in later. Scouting also helps identify which species of beneficial insects are present and what impact they have in the landscape.

A few key insecticides that should be considered in this conservation role are Ultra-Fine Oil (all-season horticultural insecticide, miticide and fungicide), insecticidal soap, spinosad, Neem products and Bt. Remember that the correct pesticide has to be selected for the corresponding pest(s) problem. For example, a Bt product will work on caterpillars, but it is not the material of choice for aphids.

Some of these products can kill beneficial insects, but they have short residuals. A short residual has less of a long-term, negative impact on the nontarget organisms, including the valuable beneficial insect populations. Another consideration is if plant-feeding mites are the key problem, selective miticides should be favored over general, nonselective insecticides. Check out the BioBest or Koppert Biological Systems' Web sites, and click on the "Side Effects" section to determine what impact a specific active ingredient has on species of beneficial insects and mites (see sidebar, opposite).

Landscape design: Landscape design can play a major role in successful pest management through beneficial insects. The use of plants with different shapes, sizes and flowering habits can keep beneficial insects in the landscape. The different plant forms provide refuge for the various beneficials. A landscape planted with both woody and herbaceous plants can provide flower abundance throughout the growing season. Continued bloom from spring through fall provides essential nutrition in the form of pollen and nectar to beneficial insects that utilize plants as a supplemental food source. Though not a specific requirement, I would give special consideration to native plants if they will work in the location.

The use of natives can increase overall wildlife diversity by providing food and shelter to native pollinating insects, caterpillar species and birds.

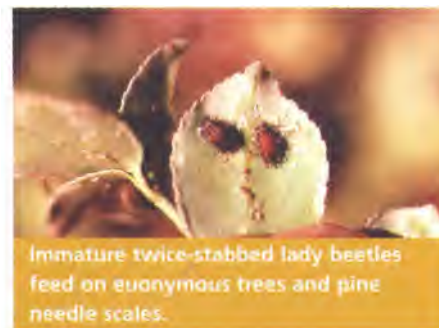
Also, there are a few commercial products available that can be applied to plants to attract beneficial insects to the site, such as AgBio Predalure, Monterey Lady Bug Attractant and the Arbico Organics line of Good Bug Attractants. There are also home recipes online (www.ghorganics.com) that consist of various combinations of water, sugar, honey and yeast that can be sprayed onto plants.

Steps for success. If a decision is made to pursue biocontrol as a pest-management option, whether through augmentation or conservation, there are a number of steps that need to be followed to ensure the best chance of success. Here are a few important ones to consider.

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Pest identification: First, as mentioned previously, employees have to be able to recognize pest insects and common beneficial insects so the correct pest-management decision is made. For example, if naturally occurring beneficials are present, are they the correct species for the pest problem? Another example would be if a release is planned, has the pest been identified correctly so the appropriate beneficial organism is purchased?

Scouting and monitoring: The major cornerstone of any IPM program is scouting, which becomes even more important if biocontrol is used. Regular monitoring enables you to track pest populations and the beneficials that are feeding on them. If beneficials are not managing the pest problem(s) at the desired level, then pesticides may be required.



Immature twice-stabbed lady beetles feed on euonymus trees and pine needle scales.

ing to pay more for insect releases when a pesticide application would potentially be cheaper and quicker.

The viability of the released insects can also be a concern. These are living organisms, and shipments may not be stored under the correct conditions during transit, or the insects may not be released in a timely fashion and may starve. Thus, too few or no healthy insects are actually released.

Finally, the correct beneficial insect, and in some cases the correct life stage, has to be selected for the pest of concern. Each beneficial insect species requires certain environmental conditions at the release site, such as ambient temperature and relative humidity. These factors have to be considered in order to ensure maximum survivability and efficacy. Plus, there is always the chance the insects will leave the release site if conditions and prey populations are not adequate.

Conservation: Conservation of beneficial insects can provide long-lasting, positive results with just some minor changes in your decision-making. For conservation to work, an increased focus on plant scouting needs to be established. Timely plant inspections can detect pest populations when they are at a lower level. This allows for the selection of insecticides that can both reduce the pest problem and,

Beneficial insect suppliers

BioBest Biological Systems —

www.biobest.be

The Green Spot —

www.greenmethods.com

IPM Laboratories — www.ipmlabs.com

Koppert Biological Systems —

www.koppertonline.com/home.asp

Rincon-Vitova Insectaries —

www.rinconvitova.com

Sterling Insectary —

www.sterlinginsectary.com

Syngenta Bioline —

www.syngenta-bioline.co.uk



Winsome fly larvae are internally parasitizing adult Japanese beetles.

Pesticides used: If a decision has been made to purchase and release a beneficial insect or mite, review what pesticides have been applied to the landscape. There are active ingredients that can have a negative impact on beneficial organisms for some time (weeks or months) after the application.

Multiple attempts: If a first attempt is not as successful as expected, evaluate what went wrong. Maybe the pest population was too high for the beneficials to succeed as the management option, or if a release was done, it's possible that the wrong organism and/or wrong rate was used. Don't give up. Select another opportunity to try biological control again.

The beneficial insects that inhabit the landscape can play a major role in successful management of certain ornamental plant insect pests. Think about these key advantages to biocontrol: no toxicity concerns to the applicator, property owner and nontarget organisms; no phytotoxicity damage to the treated plants; treated pest populations will not develop resistance; and a pesticide applicator license is not required for releases. If you have not considered beneficials, give these "good guys" a chance.

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