



The Trillium

Piedmont Chapter
North American Rock Garden Society
Chapel Hill, Durham, Raleigh, NC

Conservation of Natural Enemies in Ornamental Landscapes

By Steven D. Frank

Ever notice that plants in urban landscapes are often ravaged by pests while plants in adjacent natural areas remain undamaged? This is because in urban landscapes, many design and plant management practices favor plant feeding insects and disadvantage natural enemies. One way to help correct the imbalance of natural enemies and herbivores is to make urban landscapes more like natural ecosystems where natural enemies thrive and pest outbreaks are rare. This is the goal of conservation biological control in which landscapes and management practices are altered in ways that protect and support natural enemies while reducing practices that boost herbivore reproduction and survival. The practice of conservation biological control does not involve purchasing and releasing predators or parasitoids. Instead you are trying to ‘conserve’ the natural enemies already in the landscape and promote their survival and effectiveness.

Herbivores are very successful in ornamental landscapes because we give them the resources they need to thrive. Plants in urban landscapes often receive excessive fertilizer inputs. Fertilizer increases the nitrogen content in plants which makes them more nutritious for herbivores to consume. As a result, herbivores feeding on fertilized plants grow faster and produce more offspring than herbivores on unfertilized plants. Likewise, plants in ornamental landscapes are often under stress due to drought, poor soil, or excessive sun or shade from improper location. Stressed plants are often less able to defend themselves from herbivores because they reduce investment in defenses, such as toxins, and mobilize those resources for growth and reproduction. Thus, plants in ornamental landscapes are often more nutritious for herbivorous pests and less defended than they would be in a natural setting.

Management practices may also indirectly benefit herbivores by negatively affecting natural enemy abundance and survival. For example, urban landscapes often receive pesticide inputs which generally kill natural enemies as effectively as herbivores. For this reason, spider mite outbreaks are common after insecticide applications. The insecticides kill mite predators, such as lady beetles, minute pirate bugs, lacewing larvae, and predatory mites, more effectively than spider mites. Thus, after an insecticide application that may be targeting a different pest, spider mites will outbreak because they are released from predator control. The design and management of ornamental landscapes often creates ecosystems that are simplified in terms of plant density, structural complexity (diversity in the size and structure of plants), and plant diversity relative to natural areas. This benefits pests because, as in agricultural fields, there are many plants of the same species which happen to be the species on which they feed.

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Simplified ecosystems negatively affect natural enemies by depriving them of food and shelter found in more complex natural habitats. Increasing plant di-



iversity and habitat complexity in landscapes provides more resources for arthropod natural enemies than simpler systems. For example, increasing plant diversity by adding flowering plants provides food for natural enemies in the form of pollen and nectar. Floral resources are essential for many natural enemies such as lady beetles, minute pirate bugs, and parasitoids wasps.



Photo by Steven Frank

Predatory insects such as this soldier beetle benefit from pollen and nectar provided by flowers such as this *Monarda punctata*.

Therefore, including them in your landscape will attract and retain these beneficial insects and help their populations increase. Increasing plant diversity also increases habitat complexity. A complex habitat, like a natural forest, has many layers of vegetation such as ground covers, shrubs, understory trees, and large trees. This is important because natural enemies require more than just food to survive. They need refuge from their own predators which is easier to find in complex habitats. They also need places to spend the winter. This may be in leaf litter for some, under bark for others, or as for the praying mantis, as eggs on a dried stem. Providing a diversity of resources will ensure a diversity of natural enemies can survive and benefit your landscape.

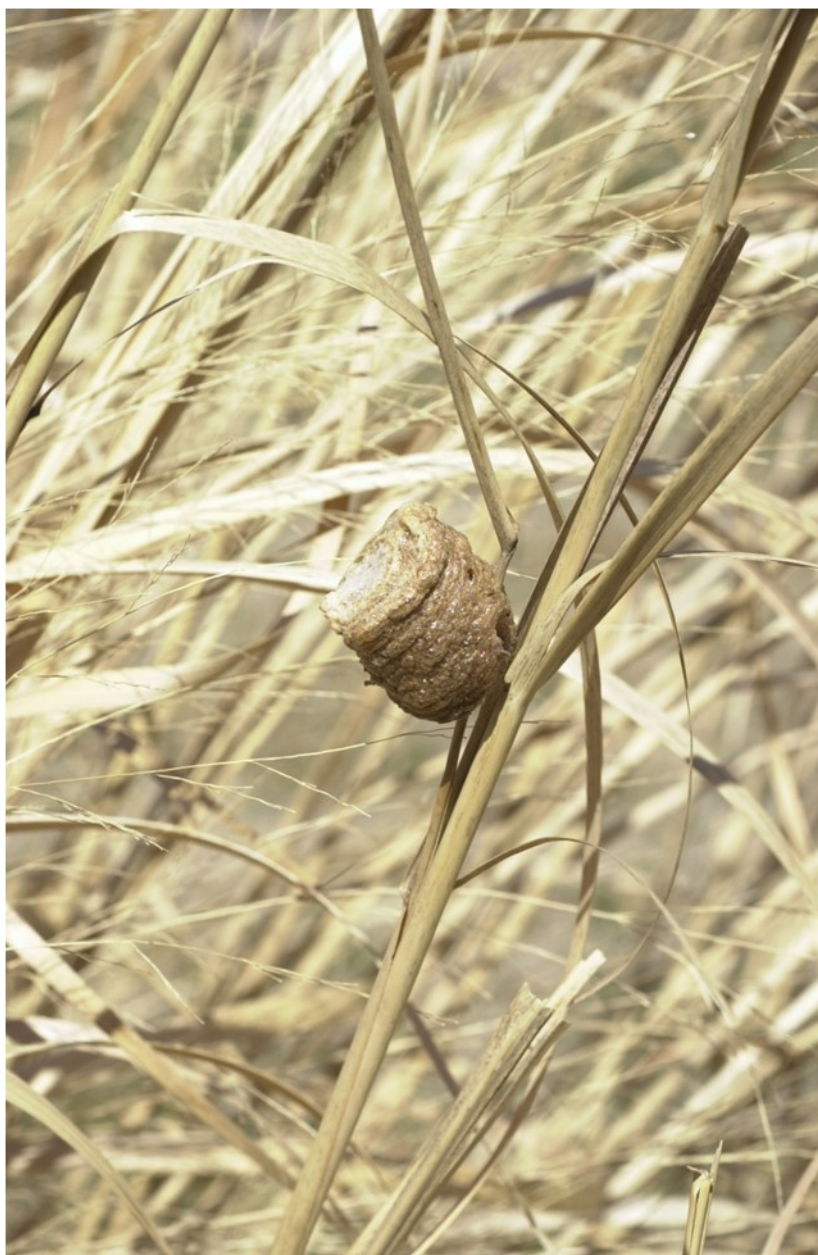
Flowering plants are a great way to add plant and resource diversity to ornamental landscapes. As a graduate student I evaluated native plants to determine which attracted the most natural enemies and thus may be useful additions to ornamental and agricultural landscapes. Three species, *Monarda punctata*, *Pycnanthemum tenuifolium*, and *Eupatorium hyssopifolium* stood out as being most

attractive to natural enemies. However, we found that natural enemies were most abundant on these three species late in the season. Early in the season *Asclepias syriaca* and *Coreopsis verticillata* harbored as many predators and parasitoids as the three top performers listed above. The most abundant groups of natural enemies captured on the foliage of the native plants were spiders, predacious beetles, predacious bugs, green lacewings, and parasitoids. Lady beetles have been shown to reduce the abundance of aphids and other pests when conserved by floral plantings although they are generally not effective when purchased and released. Spiders are particu-



Photo by Steven Frank

Monarch butterfly caterpillars and lady beetles both benefit from having *Asclepias* species in the landscape.



Maintaining diverse plant forms year round provides resources for insects as indicated by this praying mantis egg case on a switchgrass stem.

by Steven Frank

larly effective at consuming caterpillars, plantbugs, leaf beetles and other large pests that may not be consumed by smaller predators. Parasitoids are also very attracted to many native plants. These are tiny (often 1-3mm) wasps that do not sting people but lay eggs in other insects. The egg hatches and the larva feeds on its host until eventually emerging as an adult. There are parasitoids of every imaginable insect but many attack aphids, caterpillars, mealybugs, and scale in ornamental landscapes.

In conclusion, native flowers and grasses can be important in supporting natural enemy populations in the landscape. It is important to remember that adding floral resources is only part of a well rounded IPM program. Thus don't expect that planting some of the plants we investigated will solve all the pest problems in your landscape. However, creating urban landscapes that are more similar to natural areas in plant diversity and structural complexity creates a more balanced ecosystem where severe pest outbreaks are less common. To this end, a combination of flower and grass species may be most successful at harboring an abundance of natural enemies from multiple guilds that attack pests on the ground and in the foliage of pest prone plants leading to a more sustainable urban landscape requiring fewer pesticide inputs.

More extensive details on this study can be found in: S.D. Frank, P.M. Shrewsbury, and O. Esiekpe. 2008. Spatial and Temporal Variation in Natural Enemy Assemblages on Maryland Native Plant Species. *Environmental Entomology*, 37(2): 478-486.

Additional information on native plants and arthropod natural enemies can be found at: <http://nativeplants.msu.edu/>

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Integrated Pest Management (IPM): Garden Insect and Disease Control

By Robert Mugaas

Over the past couple of decades there has been ever-increasing scrutiny of the products utilized for controlling pests in our home yards and gardens. That scrutiny is largely based on our growing safety concerns regarding those products, especially pesticides, to adversely impact human, animal and environmental health. In addition, there is increasing disappointment among homeowners and professionals alike with the overuse, misuse and indiscriminate use of pesticides in our environment. It is in this light that new approaches and new strategies are being considered and implemented for managing and controlling pests in our yards and gardens. Enter, Integrated Pest Management (IPM).

IPM described

Integrated pest management is a much more ecologically based approach to pest control. The basic premise of IPM is to minimize populations of pests rather than implementing practices attempting to completely "eradicate" a particular pest. History would tell us that many times these efforts are futile. A continually expanding body of scientific evidence would also suggest that the eradicated pest control philosophy - which only uses broad spectrum, persistent pesticides - is technologically unsound. Where plant insect pests and diseases are concerned, the practice of IPM seeks to regulate their numbers to "tolerable" levels. That is, the degree of pest infestation is kept to a level below that is considered to be a serious health threat to the plant. A healthy garden or landscape plant can tolerate even moderate levels of pest infestation without having its overall health compromised. IPM is based on a common sense approach to pest control as well as employing socially responsible courses of action. However, it is important to remember that IPM does not categorically reject the use of traditional pesticides. Rather, their use is considered only when used for emergency measures such as when natural factors and other pest suppression efforts fail to keep pest populations below economic or damage thresholds. In IPM terms, this is called the "treat-only-when-necessary" approach. The term pesticide is applied to all chemical or biological products designed to "kill a pest." These include products for killing weeds (herbicides), insects (insecticides), diseases (fungicides) and rodents (rodenticides). In an IPM program, pesticides are carefully selected and applied for specific and selective action on the pest and for minimal disturbance to beneficial species, and of course to humans, wildlife and the environment.

Remember, doing nothing can be a valid IPM alternative. In general, IPM rejects the notion of routine application of broad-spectrum pesticides while embracing the use more natural pest mortality factors such as parasites, predators and diseases. In addition, IPM can include human-developed methods for controlling pests through better yard and garden planning, using resistant plant varieties, crop rotation, various cultural practices and reducing the amount of insect or disease pressure by sanitation or trapping. IPM is very practical and can be adopted by anyone, even those casually interested in gardening. It can also be cost effective, environmentally responsible and intellectually appealing. Below are some general cultural practices that can easily be integrated into a home IPM program, followed by a brief list of some "organic" pest control products that are more commonly available from local garden centers.

Cultural practices common to IPM

- Whenever possible, buy pest resistant varieties of plants. Traditional plant breeding methods have greatly increased the number of plants available resistant to diseases and even some insects.
- Select only plants well adapted to the particular site where they will be planted as well as to general climate zone here in the Twin Cities. We are considered Plant Hardiness Zone 4. Poorly adapted plants or plants planted in the wrong site conditions are usually more difficult to keep healthy and vigorous.
- When possible water vegetable and flower plantings at ground level with a hand held watering device or



using a slow trickle from the nozzle or specially designed trickle type of soaker hose. This will help keep the foliage dry and is more conservative of water. If using an overhead sprinkler, water early in the day such that the foliage will have a chance to dry off before evening.

- Thoroughly inspect plants on a regular basis; especially check the undersides of leaves. Deal with any developing problems before they get out of hand.
- Finally, use organic mulches around your plants to help conserve soil moisture, moderate soil temperatures and provide weed control. Some commonly available organic mulches include compost, shredded leaves, clean hay or straw, shredded wood and wood chips.

Naturally based pesticides

If the occasion arises where you do need to provide some insect or disease control, here are some organic products that can be used. Most are readily available at garden centers under a variety of trade names.

Product and Activity:

- **Bacillus thuringiensis (BT):** Bacteria for controlling caterpillars of butterflies and moths.
- **Copper based materials:** Some fungicide and insecticide activity.
- **Diatomaceous earth:** Treatment primarily for garden slugs.
- **Horticultural oils:** Fungicide and insecticide activity.
- **Insecticidal soaps:** Mostly insecticide activity.
- **Liquid formulations of lime-sulfur:** Fungicide and insecticide activity.
- **Neem products (Azadirachtin):** Fungicide and insecticide activity.
- **Pyrethrum (Pyrethrin):** Insecticide.
- **Sulfur:** Fungicide and insecticide activity.

From "Lawn and Garden Care the Natural Way", Lake Michigan Federation

Non-Toxic Pesticide Recipes

Pesticides are chemicals designed to kill insects, rodents and weeds. However, they can also be poisonous to humans, pets and wildlife.

Prevention:

- **Ants:** Place dried, crumbled bay leaves in doorways and windowsills. Washing counter tops with vinegar and water is also effective in preventing ants.
- **Caterpillars:** Use "stickum" made from 1 1/2 cups rosin (available from athletic supply stores), 1 cup linseed oil and 1 tablespoon melted paraffin. Mix together and put around the trunk of your trees or plant bases.
- **Cutworms:** Apply mixed molasses and cornmeal near the base of each plant.
- **Aphids:** Cut up 3 pounds of rhubarb or elder leaves. Boil half an hour in 3 quarts of water, strain and cool. Dissolve 1-ounce soap in one quart of water. Mix the two solutions and spray.

Other Non-toxic Insect Sprays:

- **Hot Peppers:** Boil 2 or 3 very hot peppers, half an onion and one clove garlic in water. Steep for 5-10 hours and drain through cloth. Spray on foliage. Avoid contact with eyes.
- **Soap:** The least toxic chemical for many gardeners is a soap mixture. Spraying plants with soap water will control aphids, mealy bugs, thrips, red spider mites, and lice. Mix two tablespoons of liquid soap per one quart water. Spray on plants. **WARNING:** Using pure soap, additives or detergents may damage plants.
- **Tobacco Water:** Place a large handful of tobacco into four quarts of warm water. Let stand for 24 hours. Dilute and apply with a spray bottle. **WARNING:** This tobacco spray is poisonous to humans: use caution when handling.
- **Garlic:** Mix four quarts water, two tablespoons garlic juice (do not use garlic powder, it will burn



plants), 32 grams of diatomaceous earth [available at your local garden store. Please follow manufacturer's instructions carefully and ask for assistance if you are not familiar with this product], and one teaspoon or rubbing alcohol.

Companion Planting:

Certain pests dislike certain plants; use this to your advantage. By strategically planting your garden, you may avoid pest problems from ever occurring.

- Plant your beans near potatoes and you'll repel both potato beetles and bean beetles.
- Plant chives near roses and you will chase away harmful aphids.
- Plant marigolds, chrysanthemums, chives, onions, garlic, basil, savory, horseradish, mint, and thyme near your plants. The natural odors and root secretions repel some insects.
- Plant soybeans near corn to trap chinch bugs.
- Plant asparagus, marigolds or borage near tomatoes to repel tomato worms. Dill also lures them away from tomatoes.
- Plant tansy to repel cucumber beetles.
- Plant radishes to lure maggots away from sprouting corn and cabbage.
- Plant onions around your beans to repel ants.
- Scatter your onions throughout the garden instead of planting them in rows. This will discourage slow-moving root maggots that take advantage of onions planted next to each other.
- Plant onion "sets" not seeds to control onion flies.
- Plant catnip around the edge of the garden to repel flea beetles.
- "Mole plant" herbs placed sporadically through your garden discourage moles and mice.

Robert Mugaas, of the University of Minnesota Extension Educator, Environmental Horticulture has kindly offered this article for our use.

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**Piedmont Chapter NARGS
2010 Program—through April**

Sept. 25, 2010
 “Managing Arthropod Pests & Conserving Natural Enemies in Ornamental Landscapes”
 Steven Frank, Department of Entomology, NCSU
 Raleigh, NC

Oct. 23, 2010
 “Flora of the Shale Barrens”,
 Martha and Charles Oliver, The Primrose Path
 Scottsdale, PA

Nov. 13, 2010
 “Spine Freaks: Journeys into the Secret World of Agave Horticulture, Smuggling, and Spirits”
 Scott Calhoun, Zona Gardens, L.L.C.
 Tucson, AZ

Jan. 15, 2011
 “Wildflowers of the Colorado Rockies”,
 Tim Alderton JC Raulston Arboretum
 Raleigh, NC

Feb. 19, 2011
 “Gardens in Woodlands”
 Suzanne Edney, Custom Landscapes
 Apex, NC

Mar. 19, 2011
 “Our Virginia Garden”
 Bill and Linda Pinkham
 Carrollton, VA

Apr. 16, 2011
 "Confessions of a Former Garden Writer of the Last Century",
 Allen Lacy
 Linwood, NJ

Spring picnic (May): to be determined


! Plant Sale !
**Don't Forget to Bring Plants for the
Chapter's September Plant Sale**
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Plant Profile: Hollard's Gold Bear's Breeches

By Mark Weathington



Common name:	Hollard's Gold Bear's Breeches
Botanical name:	<i>Acanthus mollis</i> 'Hollard's Gold'
Family:	Acanthus (Acanthaceae)
Category:	Herbaceous perennial
Primary uses:	Shady perennial borders, woodland gardens
Dimensions:	24 inches tall by 36 inches wide, 48 inches tall when in bloom
Culture:	Part sun to part shade; Hollard's Gold bear's breeches likes deep, moist, well-drained soil. In sunny spots bear's breeches will tend to wilt even with adequate moisture, but will perk up by morning. Cut back flower stalks when they begin to discolor.
Bloom time:	Late summer
Bloom color:	White with purple to rose bracts holding the flower
General attributes:	Hollard's Gold bear's breeches is a large perennial for the part shade garden. The foliage emerges in spring bright golden green and slowly fades to chartreuse as the season progresses. Leaves are large, deeply lobed and glossy giving an architectural flair to the garden. The erect flower spikes are very sturdy and can be cut to bring indoors. The dark colored bracts with white flowers gives a two-toned effect.

Mark Weathington is Assistant Director, JC Raulston Arboretum



Plant photos provided by Mark Weathington



Piedmont Chapter Meeting



JC Raulston Arboretum
Ruby McSwain Education Bldg

Sept. 25, 2010 9:30 am

“Managing Arthropod Pests & Conserving
Natural Enemies in Ornamental Landscapes”

Steven Frank

Dept. of Entomology, NCSU, Raleigh, NC

Fall Plant Sale Follows Meeting

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OTHER SIGNIFICANT POSITIONS:

- Sept. Plant Sale Manager: Kirtley Cox
Refreshments: Gwen and Maurice Farrier

The Trillium, Newsletter of the Piedmont Chapter
The North American Rock Garden Society
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Bring Goodies to Share

If your name begins with the letter below,
please consider bringing something to share.

Sept	A—C	Jan	L—M
Oct	D—G	Feb	N—So
Nov	H—K	March	Sp—Z
April		Any and all	

FIRST ANNUAL ART IN THE GARDENS

SATURDAY, SEPTEMBER 18, 2010, 10 AM-5PM
THE GARDENS OF DUKE RALEIGH HOSPITAL

29 participating artists will offer stained glass, jewelry, photography,
painting, fiber art, wood, metal and our concrete art.

Proceeds from a Raffle of Participating Artists Work
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Renovation of Birdwood as a Hospital Hospitality House

LASTING IMPRESSIONS—AMELIA LANE & BETH JIMENEZ
Lasting Impressions, partner lastingimpressionsleaves.com

2010 Charlotte's Garden Conservancy's Open Days

September 25th & 26th,

Six private & two public gardens will open to the public through
The Garden Conservancy's Open Days Program.

10 a.m. to 4p.m. on Saturday, and 1 p.m. to 5 p.m. on Sunday.
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Open Days are rain or shine, and no reservations are required.
Call 1-888-842-2442, or go to www.opendaysprogram.org for info.