

Beneficial Insects

Insects are all around us. Scientists have described approximately a million species of insects (compare to under 6,000 species of mammals) and believe that there are many more waiting to be discovered!



Syrphid Fly

Characteristics of insects: Insects are invertebrate animals with bodies divided into 3 segments; the head, thorax, and abdomen. All insects have an exoskeleton and 3 pairs of segmented legs. Many insects have wings and can fly, but not all. Most insects go through some form of metamorphosis, allowing the larval and adult form of the insect to occupy different habitats and behavioral niches.

Insects live in almost every conceivable habitat; there are insects that live in soil, in water, inside plants, and even insects that live inside other insects. Insects benefit humans in a variety of ways. Two major categories of beneficial insects are natural enemies and pollinators.

Natural Enemies:



Pink Spotted Lady Beetle

Natural enemies are insects that kill pest organisms (such as insects that cause damage to crops or vector diseases). There are two main categories of insect natural enemies; predators and parasitoids.

- **Predators**

Insects that eat pest organisms are known as predators. Most insect predators that have been well-studied and shown to be beneficial in controlling pest populations are generalist feeders, meaning that they have a varied diet and often eat many different types of prey.

Some Examples of Native Predator Insects:

Common Name	Scientific Name	Prey Organism (s)	Life stage as Predator
Lady Beetles	<i>Coleomegilla maculate</i> <i>Hippodamia convergens</i>	Aphids, Insect eggs	Larvae, Adult
Praying Mantis	Order: Mantodeae	Anything smaller than it within reach	Nymph, Adult
Minute Pirate Bug	<i>Orius spp</i> <i>Anthocoris spp</i>	Thrips, Whiteflies, Aphids, small caterpillars, Leaf hoppers, eggs	Nymph, Adult
Assassin Bugs	Family: Reduviidae	Anything they can catch	Nymph, Adult
Spined Soldier Bug	<i>Podisus maculiventris</i>	Cabbage looper, Corn earworm, Potato beetles, Armyworm, and others	Nymph, Adult
Lacewings	Order: Neuroptera	Aphids, Whiteflies, Spider mites, Thrips, Beetle larvae, and eggs	Green – Larvae Brown – Larvae and Adult

Flower Flies Hover Flies	Family: Syrphidae	Aphids and other soft bodied insects	Larvae
Solitary Wasps Paper Wasps	Order: Hymenoptera	Caterpillars and others	Adult kills or paralyzes and feeds prey to larvae

- **Parasitoids**

Parasitoids are insects that lay their eggs in a “host” organism (usually another insect). The larval form of the parasitoid grows inside the host, either emerging to pupate or as an adult, and almost always killing the host insect.

Some parasitoids paralyze their host, while others cannot be detected prior to emergence, and the host will continue to forage and sometimes even lay eggs.

- General characteristics:

- Small – almost always smaller than their host
- Highly specific – parasitoids are very specialized in which host they choose, sometimes even so much so that different parasitoids attack different life stages of the same animal
- All parasitoids have complete metamorphosis. Most are wasps (Family: Brachonidae and Ichneumonidae, Genus: Trichogramma) or flies (Family Tachinidae), though there are a few parasitoid beetle species.

- Other – the use of insect natural enemies and other living organisms (fungi, bacteria, spiders, mammals, etc.) as a way to reduce pest populations is called Biological Control.



Pollinators

It is estimated that anywhere from 60-90% of the flowering plants in the world depend on animals for pollination (reproduction). The vast majority of pollinators are insects.

There are over 100 species of crop plants in North America that rely on insect pollination.

The more common animal pollinators include bats, birds, flies, beetles, butterflies, moths, ants, wasps, and bees.

- Bees:

Honey bees are not native to the US. Honey bees pollinate about 15\$ billion in US crop plants each year. It is estimated that they pollinate about 15% of the most common crops worldwide. Honey bee numbers are declining, and as they decline, the relative importance of other pollinators (such as native bees) increases.

- Native bees

Bees are important pollinators that have 2 main lifestyles; social bees, such as the honey bee, that live in colonies, and solitary bees. Most of our native bee species (approximately 4,000 in the US) are solitary bees.

The only native social bees are bumblebees. Bumblebees preferred nest sites are in the ground, often abandoned burrows, but they will nest in any hollow cavity. They are generalist foragers, meaning that they gather pollen and nectar from a wide variety of plants and are active from February to November. Solitary bees lay eggs in a variety of places, from leaf litter to old twigs.

Others: Though not as efficient as bees, butterflies, moths, wasps, beetles, flies, and other insects are also important as pollinators.



Attracting and Protecting Beneficial Insects in your Yard/Garden

- Do not buy and release natural enemies such as Lady Beetles. Many biological control agents that are sold for small scale release are caught in the wild before being sold. When you release these insects in your garden, you run the risk of introducing a new disease or other pathogen into wild populations of insects. Instead, make your garden attractive to beneficial insects, and they will come to you.
- Pollinators aren't the only insects that need flowers. Many adult natural enemies either only eat nectar and pollen or supplement their diet with it when other prey is not available. Provide a variety of native flowers that
 - Have various sized blooms
 - Are different colors
 - Bloom at different times throughout the growing season, so that something is always in flower
 - Plant flowers in clumps to attract more beneficial insects – clumps are easier to find and offer a larger “reward” so that the insects will want to hang around
- Allow a little mess: many insects over winter in leaf litter, solitary wasps and bees may nest in holes in bare ground and twigs or limbs provide shelter for beneficial insects. Allowing a little portion of your garden to be “natural” will help attract natural enemies.
- Provide a variety of microhabitats (patches of different native plants, rocks, bare ground, shallow running water, etc.) to make your garden hospitable to lots of different beneficial insects.
- Avoid broadcast pesticides and herbicides. If you must use a chemical, choose one that is as specific to the pest as you can, and apply in spot treatment rather than a broadcast spray.
 - Instead of pesticides use cultural planting practices and physical barriers to prevent pest outbreaks (crop rotation, multi-crop systems, hedgerows/ windbreaks of native plants, cover crops, companion planting) and encourage the presence of beneficial insects.



- Include a water source (preferably running, with shallow spaces or rocks and pebbles that break the surface) in your garden. Insects need water too, and a shallow or slightly sloping base will keep them from drowning.
- Get rid of the grass: plant flower beds with native plants instead. Once they are established, many native plants require less water than a lawn, since they are adapted to our climate.
- Conserve and protect natural areas.
- Selectively remove any invasive plant species through mechanical means when possible, and plant natives in their stead.
- Install simple bee boxes for native bees.

Resources:

Short list of native flowering plants that are good for native bees from the University of Georgia: includes months when blooming. <http://www.ent.uga.edu/Bees/pollination/plants-year-round-forage.html>

Brochure about pollinators: includes a longer list of native plants good for attracting native pollinators. <http://www.pollinator.org/PDFs/Guides/SoutheastMixedForestrx5FINAL.pdf>

The Ladybird Johnson Wildflower center has a database where you can search native plants by state, bloom month, color, habitat requirements, and more. <http://www.wildflower.org/plants/>

For more detailed information about insect predators, parasitoids, and other biological control agents: <http://www.biocontrol.entomology.cornell.edu/index.php>

How to make bee boxes from the Xerces society:

http://www.xerces.org/wp-content/uploads/2008/11/nests_for_native_bees_fact_sheet_xerces_society.pdf

