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# Managing City and Suburban Yards and Gardens to Sustain Insect Communities

Insects are an important part of healthy ecosystems in cities and suburbs, but landscaping often does not consider the needs of insects. Small changes to the management of yards and greenspaces that consider the food and habitat requirements of insects can have a big impact on the health and sustainability of insect communities.

## Why are insects in cities and suburbs important?

Insect populations are threatened in Maryland and globally. Increasing pressures on insect communities are resulting in fewer insects and less diverse insect communities. Maintaining diverse and healthy insect communities within human-built environments such as suburban landscapes is important because insects provide important ecosystem services including:

- Pollinating crops and flowers
- Serving as a food source for birds and other wildlife
- Functioning as predators that provide biological control by eating pest species
- Supporting healthy soil development by breaking down dead plants and recycling nutrients
- Increasing air and water flow to plant roots and decreasing soil compaction.

## But aren't insects pests?

Hundreds of different kinds of insects can be found in a residential yard or garden, most of which have no major negative impact on plants in yards or on humans. Only a handful of insect species (< 1%) have the potential to become pests. Insects only become pests when their populations become so large that they cause aesthetic or economic losses to humans. This threshold depends on the insect species and the context. Some insects become pests because of the threats they pose to important agricultural crops. Others become pests when their populations are not kept in check. This may be due to an overabundance of high-quality plant resources or a lack of natural predators in the yard to eat the pests. A lack of natural predators can occur when an insect from another region is introduced or if native predator populations decrease due to pesticide use and other landscaping practices. In all these cases, management decisions made by humans play an important role in promoting pest outbreaks in gardens and yards.

We often do not think about insects until they are found in high abundance or become pests by eating plants or flowers in our gardens, but all native insects can be part of a healthy insect community. And like all animals, insects have certain requirements to survive, including suitable habitats for survival in all seasons and parts of their life cycle.

## What do insects require to complete their life cycles?

Insects require different types of habitats at different stages of their life cycles. Generally, insects are more noticeable as larvae (an active, immature life stage that can have multiple stages, like caterpillars), and as adults (like moths). But eggs and pupae (the life stage between larva and adult, like a chrysalis) require habitat as well. Figure 1 shows the life cycle of the luna moth and demonstrates how the insect's habitat needs change with its life cycle stages. Other insects have similar requirements based not only on their life cycle but on the seasons.

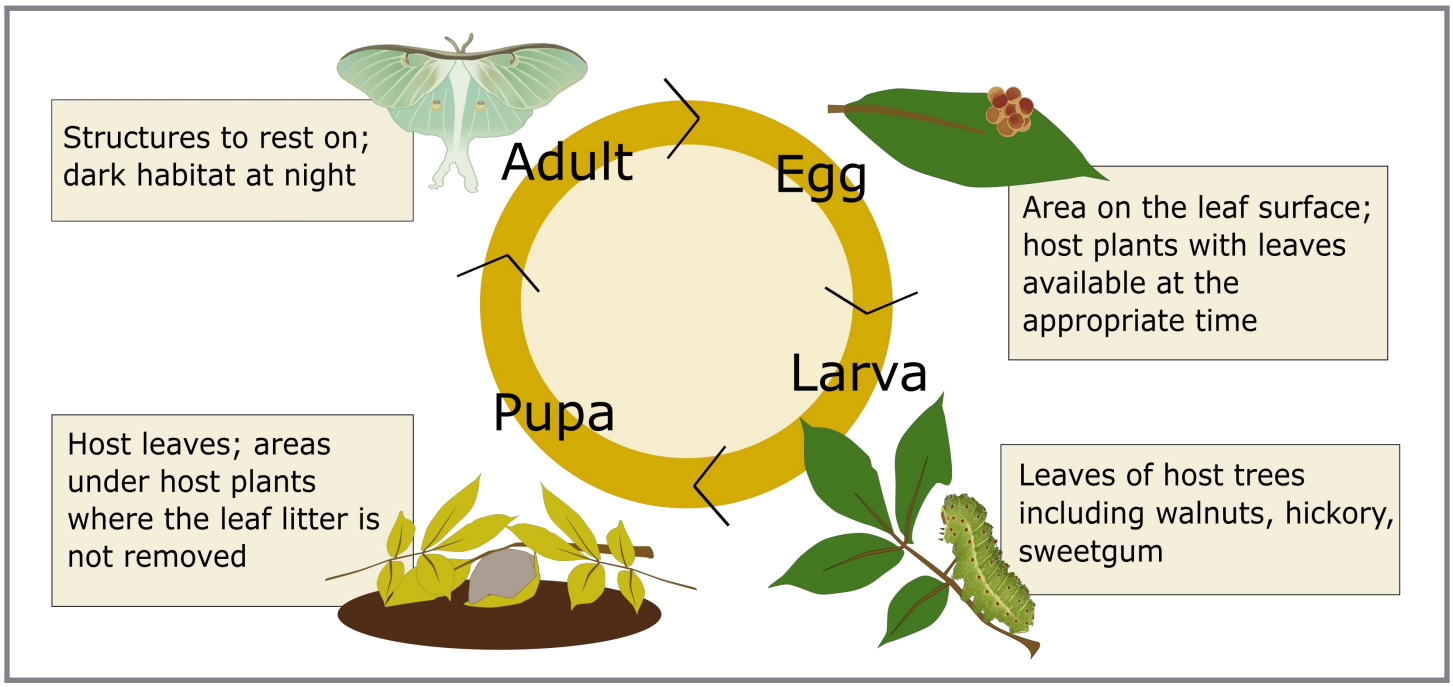


***Figure 1.*** *Life cycle of an example insect: the luna moth (Actias luna). Habitat types required by each life stage are highlighted. Image credits: A portion of this figure incorporates individual vector graphics from: Tracey Saxby, Jane Hawkey, Jane Thomas, Brianne Walsh, Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/imagelibrary/)*

## Where do insects go during the winter?

Some insects – like monarch butterflies – are famous for their migrations to warmer climates during Maryland winters. But even though we don't often see them, most insects spend their winters in Maryland!

Insects usually spend their winters doing what scientists call "overwintering"- taking shelter in the soil, on plants, or in fallen leaves. By becoming less active and hiding in the soil or under layers of leaves, the insects enjoy a more stable environment and overall warmer temperatures. Insects in Maryland overwinter in a variety of life stages, as some survive the cold as eggs, larvae, pupae, or even as adults, tucked away in tree holes and wood crevices! Insects need to survive the winter in all environments, but management differences between urbanized and rural environments can create additional challenges for insects in urbanized environments across all seasons.

## How are city and suburban environments different from rural areas and unmanaged environments?

The plants in urban and suburban areas can be very different from plants in unmanaged or rural areas. Often there is lower overall plant coverage, and the plants that are present are less likely to be native species. Plant communities might also change throughout the year as humans manage plants through weeding, raking, pruning, fertilizing and other management strategies. These changes can reduce the habitats available to insects as well as their food resources.

The changes to the plant community are just one aspect of how cities and suburbs present challenges to insect communities. Roads and development can lead to soil compaction. Sewer and stormwater management systems alter the way that water flows in nearby rivers and creeks. From the perspective of an insect, these can all be important alterations to habitat availability.

Insects are often less abundant and have lower diversity in urban and suburban areas. This can be due to big-picture constraints, such as roadways and physical

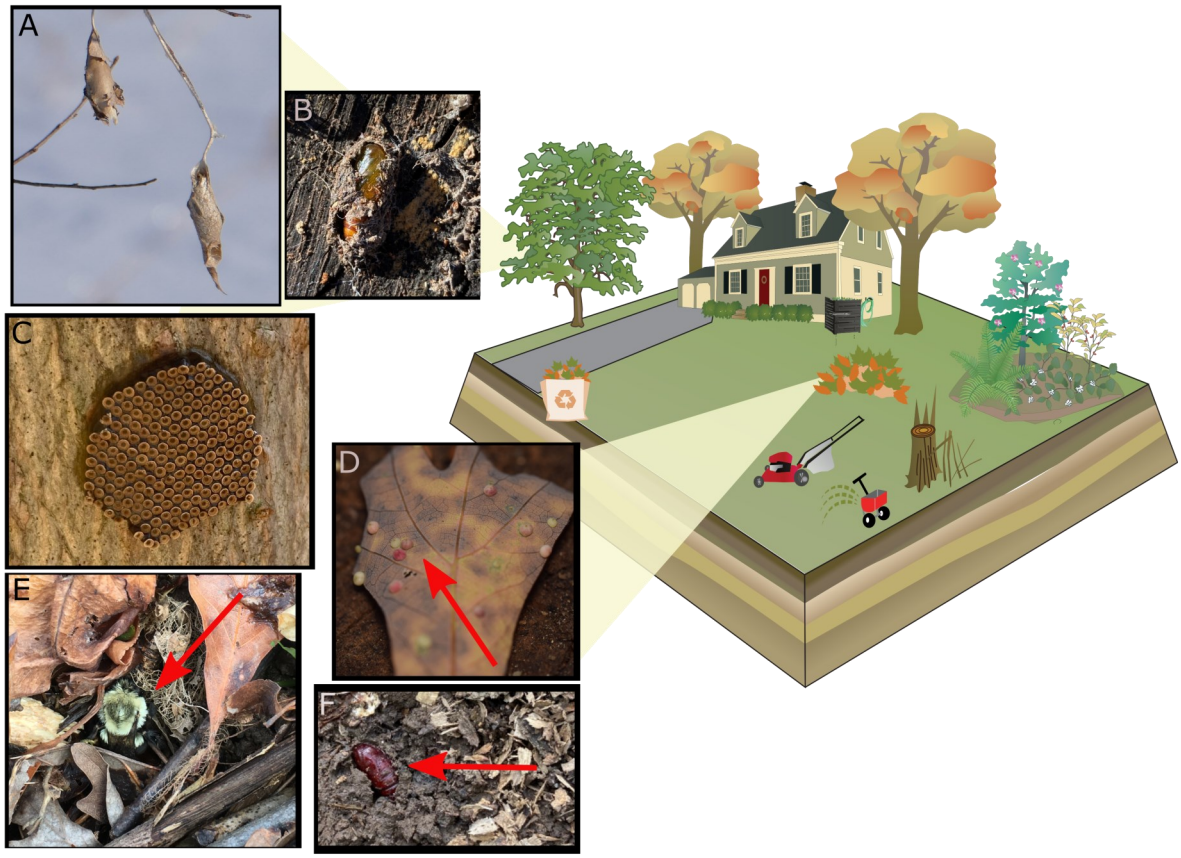


***Figure 2.*** *Places in a yard where insects might overwinter:* ***(a)*** *Promethea moth cocoons on the ends of tree branches;* ***(b)*** *a pupa in a bark crevice;* ***(c)*** *wheel bug eggs on a tree trunk;* ***(d)*** *leaf galls formed by herbivorous wasps on a fallen leaf;* ***(e)*** *an overwintering bumblebee queen in leaf litter; and* ***(f)*** *a pupa in the soil of a mulched garden bed. Image credits: Photos taken by K. Burghardt. A portion of figure incorporates individual vector graphics from: Tracey Saxby, Jane Hawkey, Jane Thomas, Brianne Walsh, Diana Kleine, Krim Kraeer, Lucy Van Essen-Fishman, Nicole Lehmer, Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/imagelibrary/)*

structures in cities and suburbs. However, insects also respond to factors on a smaller scale, including which plants are present in a suburban yard or park. Recent research has shown that the number of insect species can increase by 30% when there is a suitable plant community, even in a small area (Adams et al. 2020). Figure 2 shows how the management a typical suburban yard can alter overwintering habitats for a variety of insects.

## What changes can be made to encourage healthy insect populations and communities in yards and urban greenspaces?

Residents with yards or outdoor spaces of any size can take action to facilitate, attract, and increase healthy insect populations. Using the management guidelines below will decrease the likelihood of pest outbreaks and increase insect-associated ecosystem services, like food and flower pollination, pest control and nutrient cycling.

### Provide proper and adequate food sources throughout the year

Insect food needs may change with their life stage! For example, some adult moths can consume nectar from many types of flowers, but their caterpillar larvae may be "specialists," meaning they can only eat a single type of plant. Residents and property owners can provide vital insect foods by:

- Planting native species whenever possible. Focusing on native plants makes it more likely that many kinds of native insects, including butterflies (Smith & Davidson, 2014), will be able to use your plants for food. Many guides exist for native Maryland plants (Slattery et al. 2003; Chesapeake Bay Native Plant Center, 2016).

- Planting a variety of trees, shrubs, and herbaceous plants to help provide a steady supply of many types of food (leaves, nectar, pollen, fruits, or other arthropods) for insects to eat throughout the warmer months.

### Provide places for insects to spend the winter and early spring

Even with plenty to eat in the warmer months, insect populations cannot survive without places to spend the winter. As described above, many insects spend the colder months in leaf litter and the top layers of soil.

- In autumn, do not clear fallen leaves from your entire yard and allow dead stems of flowering plants to remain standing through the winter, rather than cutting everything back to the ground. Leaving some areas untouched –even small patches –ensures that there are areas where insects can spend the winter safely. Note: This practice is recommended only if plants are healthy. Removal of leaves may be required to prevent pathogen spread if plants are diseased.
- One strategy is to create "tree shadows." These are areas where you contain all fallen leaves under the drip-line of shade trees, the areas directly under the tree's canopy. These leaves will serve as mulch, retain water, and provide nutrients to the trees the following year. You can use these areas as planting beds for herbaceous plants such as sedges, asters, or spring ephemerals which protects trunks and root systems from lawnmower damage. Using stone or wood edging will help prevent leaves from blowing out of the desired area.
- Consider postponing the removal of twigs, branches, and logs to feed decomposers and provide overwintering locations for insects. One option is to leave dead trees or shrubs in place (where it is safe to do so) and use them as a trellis for native vines. Another is to create decorative bundles of fallen twigs and small branches to be focal elements in planting beds. Note: Always ensure dead wood materials are at least five feet away from the foundation of buildings.
- When soil is too compacted or is covered with pavement or deep mulch, insects are unable to burrow in or out. Minimizing the size of your driveway, deck, or paved patio, aerating lawn areas, and low-till gardening can help reduce soil compaction.

### Manage pests and weeds responsibly

Pesticides applied to control pest species can kill or injure native and beneficial insects as well. Further, non-native and invasive plant species may not provide adequate nutrition. Here are some tips to help manage these threats:

- Learn to identify key beneficial insects (Maryland DNR, n.d.) and pests (University of Maryland Extension, n.d.) in your area. Basic identification skills can help you decide when action is required to manage pest species.
- Use non-chemical methods to control pests and weeds. Pull weeds or invasive plants (Boley, 2021) when the soil is moist and the plants are young. Pesticides, including those labeled natural or organic, can harm pollinators and other non-target insects. If you decide to use a pesticide, select a low-risk option, and follow the label instructions (University of Maryland Extension, 2022).

## What can residents without yards do to help?

Those with access to a balcony or rooftop can plant native plants in pots or window boxes. Even if you don't have any outdoor space, you can promote healthy insect populations through joining a community garden, educating others, and volunteering with local parks, public gardens, and environmental groups (Maryland Native Plant Society, n.d., Maryland Department of the Environment, n.d.).

Encouraging healthy insect populations can provide many benefits in cities and suburbs. Incorporating a few simple practices to annual yard and greenspace management can provide essential food and habitat to insects, which in turn will support urban and suburban ecosystems.

## Resources:

Adams, B. J., Li, E., Bahlai, C. A., Meineke, E. K., McGlynn, T. P., & Brown, B. V. (2020). Local-and landscape-scale variables shape insect diversity in an urban biodiversity hot spot. *Ecological Applications*, 30 (4), e02089.

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