



Fact Sheet FS1369

# Why Leave the Leaves and How to Do it

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More than 100 million years ago, trees evolved alongside their natural process of shedding leaves. Countless species of beneficial soil organisms also evolved with leaf drop, decomposing leaves and cycling nutrients for plant uptake while sequestering massive amounts of carbon. Arthropods and insects also evolved with leaf litter, requiring leaves for their survival. Allowing leaf decomposition in place is an ancient building block that sustains all forms of life in the natural food web and significantly contributes to the health of our planet. Yet, in developed landscapes, fallen leaves are usually treated as a waste product that is disposed of off-site. Moreover, widespread practices of blowing and transporting leaves pose serious threats to our environment, human health, and quality of life. The following sections explain the benefits of leaving leaves, while the final section, "How to Leave Leaves," describes strategies for ornamental landscapes.

## Leaves Are Not Litter

Leaf litter is the common and scientific term used to describe fallen and decomposing leaves; however, leaves are not garbage. Leaf litter nourishes soil and sustains life and is an incredibly vital aspect of our local ecosystems.

## Soil and Plant Health

Plant and soil ecosystems have evolved for millennia to feed themselves and stay healthy through the natural process of leaves decomposing and returning organic matter to soil and plants. When leaves are removed, the natural processes that keep our plants and soil healthy are removed too. Chemical fertilization and store-bought mulches are no match for all the benefits that leaves provide to soil and plant life:

## Essential Nutrients

As leaves decompose, essential nutrients are returned to the soil naturally. Beneficial microbes, like fungi and bacteria, break down leaf organic matter and convert the nutrients into forms that plants can absorb (Figure 1).

## Soil Structure and Function

As leaves break down, they help improve soil structure by increasing its porosity. This allows roots to penetrate more easily and enhances air and water movement through the soil. It also improves water holding capacity. This is a natural way to restore compacted soils that have been damaged by machinery, mowers, and foot traffic.

## Natural Leaf Mulch Benefits

- **Soil moisture retention** reduces evaporation and decreases the need for irrigation.

- **Insulation** provided by leaf litter keeps soil cooler in the summer and warmer in the winter; this protects plant roots from extreme temperatures.
- **Weed Suppression** by leaf litter blocks sunlight from reaching weed seeds, thus reducing competition for resources like water and nutrients.
- **Erosion control** is performed by leaves left as mulch, especially during rainstorms.



**Figure 1:** Last year's oak leaves slowly decomposing with the help of small pinwheel mushrooms (*Marasmius rotula*). Photo credit: Jean Epiphan.

## Insect Habitat

Beneficial insects, like butterflies, moths, fireflies, and native bees, require leaf litter to survive (Figure 2). They are critical components of our ecosystem as they pollinate plants, consume harmful pests, and serve as food sources for other wildlife. When fallen leaves are regularly removed, beneficial insect populations plummet, which greatly harms healthy ecosystem function. Leaf litter serves as vital habitat for beneficial insects in many ways:

### Microhabitats

Leaf litter creates and maintains a stable, moist environment, which is ideal for insects like ants and beetles, as well as arthropods like pill bugs and centipedes. Many of these creatures rely on native leaf litter for egg laying sites, larval development, food, shelter, and protection from predators. For example, fireflies live the majority of their lives in fallen and decomposing leaves as larvae to hunt, feed, and seek shelter. Leaf removal is one of the main reasons why firefly populations are diminished in New Jersey.

### Overwintering

Insects utilize leaf litter as protective cover during winter months for hibernation in various life stages (eggs, larvae, pupae, or adults) such as the luna moth caterpillar (*Actias luna*) that spin its cocoon in fallen leaves to overwinter. Leaves also insulate the ground so insects that burrow in soil can hibernate. For example, bumble bee queens (*Bombus* spp.) make burrows under fallen leaves to survive the winter and start a new colony.





**Figure 2: Critters that require leaf litter for their microhabitats, overwintering, or camouflage. From left to right: Polyphemus moth (*Antheraea polyphemus*), American toad (*Anaxyrus americanus*), eastern bumble bee (*Bombus impatiens*), banded tiger moth (*Apantesis vittata*). Photo credits: Jean Epiphan.**

## Wildlife Habitat

Fallen leaves are also important for higher-order wildlife such as reptiles, amphibians, birds, and mammals. If leaves are removed, native wildlife disappear with them (except for our over-abundant white-tailed deer). Leaf litter is not literally litter; it is a vital component of healthy habitats for our local fauna:

- **Forage:** Birds, chipmunks, raccoons, shrews, and many other animals forage for food (insects, arthropods, and seeds) and disperse seeds in fallen leaves.
- **Shelter:** Many species like the American toad (*Anaxyrus americanus*), least shrew (*Cryptotis parva*), and eastern chipmunks (*Tamias striatus*), spend a large portion of their life in leaf litter, and use it as camouflage to help avoid predators.
- **Nesting material:** Squirrels, chipmunks, and several species of birds use leaf litter to build their nests. Ovenbirds build their nests in leaf litter layers on the ground.
- **Overwintering:** Many animals make burrows under layers of fallen leaves that help to insulate them and camouflages their entrances. Some species like the wood frog (*Lithobates sylvatica*) and the eastern box turtle (*Terrapene carolina*) overwinter under leaf litter.

## Human Health and Climate Resiliency

Leaving leaves helps to protect our planet's climate as well as human health. Decomposing leaf litter stores carbon in the soil, which helps fight climate change. When you choose to leave leaves, you help reduce greenhouse gas emissions while reducing risks to human health and improving quality of life for your entire neighborhood, especially high-risk populations: children, pregnant women, and landscape workers. Removing usually involves gas leaf blowers which have no pollution controls, pose significant health risks, and contribute to climate change.

- **High emission rates:** Two-stroke engines used in many gas-powered leaf blowers lack catalytic converters and emit large amounts of greenhouse gases.
- **Harmful toxins and carcinogens:** Gas-powered leaf blowers emit carbon monoxide, hydrocarbons, nitrogen dioxide, formaldehyde, benzene, 1,3-butadiene, acetaldehyde, and volatile organic compounds. These air pollutants can worsen respiratory issues, cause neurological effects, as well as contribute to heart disease, dementia, and cancers like lymphoma and leukemia.
- **Contaminant dust and particulates:** Leaf blowers kick up dust and particulates that contain pollen, mold, pesticides, and other contaminants, which can exacerbate allergies and respiratory problems.
- **Noise pollution:** Gas-powered leaf blowers exceed safe noise levels, which can cause permanent hearing damage. Noise pollution also increases stress hormones and anxiety.

- **Carbon dioxide (CO<sub>2</sub>):** Using a gas-powered leaf blower for one hour can emit as much CO<sub>2</sub> as driving a car for over 1,000 miles, depending on the specific model and type of blower.
- **Fuel consumption:** Transporting collected leaves to composting facilities, landfills, or other disposal sites requires trucks that typically run on diesel or gasoline. This contributes to greenhouse gas emissions, depending on the distance and frequency of trips.
- **Emissions from landfills:** If the leaves end up in a landfill, they can produce methane as they decompose anaerobically. Methane is a greenhouse gas that is much more potent than CO<sub>2</sub>, with a higher impact on global warming.

## How to Leave Leaves

Leaving the leaves benefits our environment and health in numerous ways. However, removing leaves is so commonplace in our society that it raises the question, "how does one make the switch?"

## Leave Leaves in Garden Beds

Move leaves from lawns and walkways into your garden beds, tree beds, or forest with manual rakes or if needed, electric leaf blowers (see figure 3 for examples of garden beds). Be careful not to put too many leaves in garden beds, because just like over-mulching, it can smother plant roots and prevent sufficient air exchange for soil microbes.

## Increase Garden Bed Area

Reduce unused lawn area that requires raking and replace it with native garden beds or forest, that benefit from leaves as mulch.

## Excess Leaves

If you have excess leaves or non-native leaf litter (less useful to native flora and fauna), use them in your compost pile. Some shred excess leaves over lawns to improve lawn and soil health. While this practice has some benefits, shredded leaves reduce habitat value for beneficial insects, so this should be avoided when possible.

## High Winds

If leaves blow around your property too much, there are a couple of strategies that can help:

- Do not cut down perennial stems; instead leave them during the dormant season to help hold leaves in beds. This also helps provide wildlife habitat.
- Add twigs and sticks to weigh down leaves; they also provide habitat and breakdown to improve soil and plant health.
- For a tidier appearance, place a light layer of natural (not dyed) wood mulch on top of your leaf litter to keep it in place.

## Signage

Install a "Leave the Leaves" sign or other message to your neighbors to let them know you care about the environment and that the leaves are intentional. This will help promote leaving the leaves in your community.

Leaving the leaves is an easy way to help protect our planet, plants, soil, and all the little creatures that depend on our healthy landscape choices to survive. Life evolved with fallen leaves, so spend less energy on removing them and more time enjoying clear air, healthy plants and trees, and the abundant wildlife that leaves support.





**Figure 3: Various garden beds mulched with leaves. From left to right: great Solomon's seal (*Polygonatum commutatum*) flourishing among leaf litter, photo credit: Jean Epiphan; vibrant moss phlox (*Phlox subulata*) and golden ragwort (*Packera aurea*) among leaf litter in native perennial bed, photo credit: Jean Epiphan; native perennial stems left in place in winter among leaf mulch in a formal garden at Van Vleck Gardens, Montclair, NJ, photo credit: Deb Ellis.**

## Resources and References

- Coalition for a Healthy & Safe Environment: [Impacts of Leaf Blowers](#).
- Hawkins, H.J., Cargill, R.I., Van Nuland, M.E., Hagen, S.C., Field, K.J., Sheldrake, M., Soudzilovskaia, N.A. and Kiers, E.T., 2023. Mycorrhizal mycelium as a global carbon pool. *Current Biology*, 33(11), pp.R560-R573.
- Lowenfels, J. and Lewis, W., 2014. *Teeming with microbes: The organic gardener's guide to the soil food web*. Hachette+ ORM.
- Mount Sinai Institute for Climate Change, Environmental Health, and Exposomics: [Gas Leaf Blowers are Health Hazards](#).
- National Wildlife Federation:
  - [Why You Should Leave the Leaves](#).
  - [Seven Species that Need You to Leave the Leaves](#).
  - [Leave the Leaves to Save Fireflies!](#)
- U.S. Department of Agriculture: [This Fall, Leave the Leaves!](#)
- Xerces Society for Invertebrate Conservation:
  - [Leave the Leaves: Winter Habitat Protection](#).
  - [Leave the Leaves!](#)
  - [Five Ways to Support Queen Bumble Bees this Spring](#).

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