LEAVE IT BE

Maintaining Leaf Litter in the Landscape

A variety of arthropods act as biocontrol agents or predators of pest insects. Many species, including beneficial species, require leaf litter as a habitat to live and reproduce. High levels of activity in human environments reduce the number of beneficial arthropods around homes, often resulting in the use of insecticides to control pest insects. Establishing and conserving leaf litter in the landscape is an effective conservation strategy to help maintain habitats for natural control agents. Protecting biocontrol agents reduces pests in the area and the need for insecticide use. Maintaining a cover of leaf litter for biocontrol arthropods creates habitats that promote reproduction, survival and the success of naturally occurring enemies of pest insects. Several types of biocontrol agents occur in leaf litter, including classical predators that consume prey; parasitoids that lay eggs on or in pest insects and, once the larvae hatch, consume the pest; and fungal and bacterial pathogens that infect insects and cause death. This fact sheet reviews several arthropod families and species that benefit homeowners by providing ecosystem services, such as pest control, when leaf litter habitats are created in the landscape.

Predatory ground beetles (family Carabidae) inhabit leaf litter and are primarily nocturnal hunters. Ground beetles consume a variety of pests in leaf litter and adjacent yards and gardens, including crane fly larvae, slugs and caterpillars. Many adults are large, have visible mandibles and are shades of black, brown or metallic colors. Rove beetles (family Staphylinidae) are small beetles (1 to 35 mm) with short elytra (wing covers) that cover the abdomens of most other beetles. Rove beetles inhabit leaf litter and consume small flies, gnats and other small arthropods. Adult beetles from these families tend to be encountered more than their juvenile counterparts, as the larvae dwell deeper in the soil profile.

Many beneficial species go dormant or "overwinter" in leaf litter when temperatures drop. Lady beetles (family Coccinellidae), soldier beetles (family Cantharidae) and fireflies (family Lampyridae) are all beetles that overwinter in leaf litter for protection. Adult lady beetles are small (1 to 8 mm) with varying colors and patterns, depending on species. Larvae are small, dark brown or black, with bright bands or spots. Lady beetle larvae and adults primarily consume aphids and scales, but also prey on mites, thrips and whiteflies. Larvae of soldier beetles are plump, dark and

Lady beetles benefit from leaf litter

Adult multi-colored lady beetle (*Harmonia axyridis*). Photo by Jong-Seok Park, Louisiana State Arthropod Museum

have a velvety texture. Soldier beetle larvae are predators of caterpillars, aphids, slugs and other soft bodied insects. Larvae hatch from eggs laid in leaf litter and develop there. Adult soldier beetles are 5 to 18 mm in size, have soft wing covers and are often found on plants, feeding on pollen and nectar. Fireflies are predatory beetles. Many adults and all larvae possess light producing organs. Firefly adults are 5 to 20 mm in size and resemble soldier beetles. Firefly larvae are voracious predators of slugs, snails, worms and caterpillars in leaf litter and moist meadows. Fireflies are negatively impacted by urban light pollution.

Members of the lady beetle genus *Stethorus* are beneficial beetles in fruit production that destroy spider mites as both larvae and adults. Presence of leaf litter spread around trunks of trees and around the orchard perimeter greatly enhances populations of these beetles by providing cover for larval habitat and adult overwintering. Adults are small, shiny, ovoid and black, measuring roughly 1.5 mm in size.

Many predatory mite species perform biocontrol services in gardens and orchards. Leaf litter can be collected from unwanted locations and placed around the trunks of trees and peripheries of planted areas, which will greatly increase predatory mite populations. For example, predatory mites in the family Phytoseiidae are common in gardens and citrus, where they consume pest mites and thrips. Phytoseiid mites are tiny, white or green in color when immature, with six legs. As adults the mites are slightly larger (0.5 mm), and may be a variety of colors (white, tan, green, orange or red) depending on the species.

An assassin bug (*Oncocephalus geniculatus*). Photo provided by Louisiana State Arthropod Museum

A female wolf spider (family Lycosidae) with spiderlings on her abdomen. Photo by Joseph Berger, Bugwood.org

Arthropods that benefit from leaf litter

A female striped bark scorpion (*Centruroides vittatus*) with hatchlings. Photo by Gerald J. Lenhard, Louisiana State University, Bugwood.org

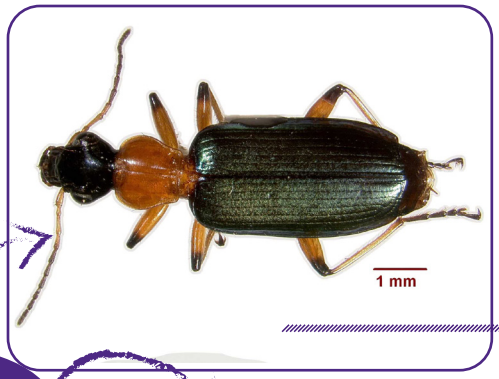
Damsel bugs (family Nabidae) are slender insects, small in size (3 to 12 mm) with piercing mouthparts called a proboscis. They have large forelegs for grasping prey and can be brown, tan or gray in color. Both adults and immature nymphs feed on caterpillars, aphids, mites and thrips. Assassin bug adults and nymphs (family Reduviidae) are predators found on plants, waiting to ambush their prey. Minute pirate bugs (family Anthocoridae) are 2 to 5 mm in length with a contrasting black and transparent triangular wing pattern. They consume aphids, scales, whiteflies and other small insects. Minute pirate bugs, assassin bugs and damsel bugs use leaf litter to overwinter.

Lacewing adults (family Chrysopidae and Hemerobiidae) are green or brown in coloration, with fragile, elongate bodies, 5 to 19 mm in length, and wings with netlike veins. Larvae are grublike with elongate mandibles. Lacewings occur on plants, feeding on pest insects, pollen or nectar. Larvae pupate on the underside of leaves to overwinter. Tachinid flies (family Tachinidae) resemble house flies in appearance, parasitize caterpillars, beetle larvae and true bugs. Many larvae pupate in leaf litter. Hover flies (family Syrphidae) are important pollinators that visually resemble bees as adults and are commonly seen feeding upon flower nectar. Hover fly larvae consume aphids, mites and scales on plants. Larvae are legless and may have distinct color patterns, stripes or spines. Many species pupate in leaf litter.

Despite the intimidating appearance of spiders, the majority are not a threat to humans. Spiders are arachnids, not insects. Spiders that do not create standing webs to catch prey are considered hunting spiders, typically ambushing prey in lieu of setting a webbed trap. They may create snare webs to assist in prey capture. Wolf, crab and jumping spiders are examples of hunting spiders. Wolf spiders are opportunistic predators, variable in size (10 to 35 mm), coloration (brown, black, tan or gray) and patterns. Females carry egg sacs and hatchlings on their abdomens. Crab spiders are aptly named due to their resemblance to crabs, including sideways or backward movement, and are commonly found on flowers. Crab spiders are usually 2 to 8 mm in size. Typically, they are either dull brown, gray, bright yellow, green, pink or white in color. Jumping spiders are active hunters and pounce on prey when close. Jumping spiders vary in color, pattern, and size (1 to 35 mm). Leaf litter provides a habitat for spiders to hunt, dwell and remain protected. Spiders may also deposit egg sacks in leaf litter as an overwintering strategy.

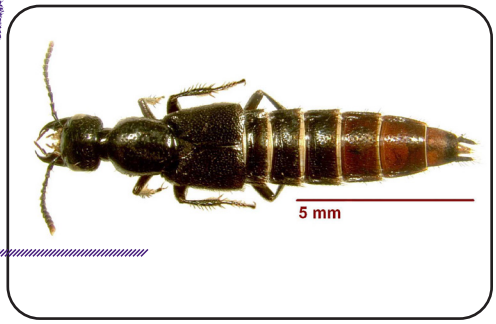
We have two species of scorpions in Louisiana, the striped bark scorpion (*Centruroides vittatus*) and the southern unstriped scorpion (*Vaejovis carolinianus*). Both are predators and serve as biocontrol agents. Both scorpion species have limited distributions within the state, occurring in leaflitter, under bark and under rocks. The striped bark scorpion is a medium sized scorpion (70 mm as adults) and the most common scorpion in the U.S. As indicated by its name, the striped bark scorpion has two dark longitudinal stripes that run the length of its carapace and the remainder of its body is pale yellow. The striped bark scorpion is gregarious, with a complex mating system. In Louisiana it is restricted to woodlands in western and northwestern parts of the state. The southern unstriped scorpion is small (40 mm as adults) and dark brownish-red. It occurs in deep leaf litter in southeastern Louisiana

A stone centipede (*Lithobius* spp.) resting in soil. Photo by Joseph Berger, Bugwood.org



A ground beetle (*Calleida decora*) with metallic elytra and an orange thorax. Photo by Louisiana State Arthropod Museum

Those that that benefit from leaf litter



A large predatory rove beetle (*Hesperus apicalis*). Photo by Louisiana State Arthropod Museum

and is rarely encountered. Both species are nocturnal and emerge at night from their hiding places to forage. They are opportunistic predators feeding on a variety of organisms including arachnids and other scorpions. Both species are capable of stinging, but it is similar to a bee sting and is not of concern unless the individual is allergic to its venom. Scorpions give birth to live offspring, and females carry their young until they molt for the first time.

Centipedes are another relative of insects occurring in leaf litter. Centipedes are flattened, with long, many segmented bodies bearing one pair of legs per segment. Many species of centipedes occur in Louisiana, but most are small and rarely noticed. Centipedes have powerful jaws, are venomous, and if they are large enough, can deliver a painful bite if handled. The largest species is the giant red-headed centipede (*Scolopendra heros*), which can grow to 200 mm in length. It is restricted in the western portion of the state. Their yellow legs contrast with the black or red body. Centipedes hide under stones, in leaf litter and under bark. Centipedes forage at night for small insects such as cockroaches. Centipedes lay eggs in leaf litter, and females of many species curl around the eggs and newly hatched immatures for protection.

An important consideration for maintaining biological control agents is to avoid applications of broad-spectrum insecticides to gardens and habitats where you want beneficial organisms to thrive. As indicated by the name, these insecticides will cause mortality in all insects and other arthropods, regardless of whether they are pest species or beneficial natural control agents. When pest insects return, fewer natural species will be present if insecticides are improperly used in these areas. Having a reasonable tolerance for the presence of pest insects is important for maintaining biocontrol agents as well. After all, if there are no pests for the biocontrol to consume, biocontrol populations will not be supported. Maintaining areas of the yard with a thick covering of leaf litter and coarse woody debris will help promote a healthy balance between beneficial species and their prey.

RESOURCES

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