UTAH PESTS fact sheet
EXTENSION UtahStateUniversity
Published by Utah State University Extension and Utah Plant Pest Diagnostic Laboratory Ent-200-18PR February 2019

Beneficial Predators: Syrphid Flies

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What you should know

- Syrphid flies are common residents in agricultural areas, gardens, and home landscapes providing pollination services.
- Larvae of syrphid flies are important beneficial predators of soft-bodied pests providing naturally occurring pest control.
- Syrphid flies cannot be purchased commercially but populations can be conserved by reducing broad-spectrum pesticide use.

Syrphid (pronounced 'sir-fid') flies, also known as hover flies or flower flies, commonly occur in field crops, orchards, gardens and home landscapes. They are members of the Syrphidae family. They are "true flies" meaning they have one pair of wings as adults. As they grow, they undergo complete metamorphosis with an egg, larva, pupa, and adult stage. As a large group of about 6,000 described species, they live in a wide variety of aquatic and terrestrial habitats occupying diverse ecological roles. A few feed on plant parts and have been used as biocontrol agents for invasive weeds such as the musk thistle flower fly. The larvae of many other species often go unnoticed, living on crop, garden, or ornamental plants and are beneficial predators of small soft-bodied pests like aphids, thrips, and scale insects. Adults may feed on pollen and nectar, pollinating plants in the process.

Predatory syrphid fly species provide natural pest control known as biological control. Aphid-consuming species most likely to be found in Utah landscapes include *Allograpta obliqua*, *Paragus volucris*, and multiple species of *Eupodes*, *Sphaerophoria*, and *Syrphus*. Encouraging beneficial predator populations can be a useful component of a greater integrated pest management program to protect plants from excessive pest damage without requiring the use of insecticides.

DESCRIPTION

Eggs are oblong, white or grey with a lace-like pattern on the surface, and measure around 1/16 inch long. They are laid singly on plants often near dense colonies of prey which are located by females by olfactory, visual, and tactile cues.

Larvae can be found living among their prey, although are sometimes misidentified as pests, such as sawfly larvae, slugs, alfalfa weevil larvae, or different kinds of caterpillars (Table 1). Syrphid fly larvae have a tapered anterior which lacks an external head capsule. The flattened rear has two small breathing holes (spiracles). Larvae are semi-translucent, often being striped or mottled in shades of white, green, tan, or brown with additional small bumps or spikes (Fig. 1). Being 1/16 inch long upon hatching, they are typically less than 1/2 inch long once they are full-sized.

Table 1 Syrphid larvae can be mistaken for pest insect larvae but have unique identification characteristics upon closer inspection.

Syrphid fly larva • No head capsule • No eyes • No legs • Posterior spiracles	
Alfalfa weevil larva • Small brown head • Small eyes • No legs • Pale stripe on back	
Various caterpillars • Large head • Small to large eyes • Front and hind legs • Fine hairs abundant	

Fig. 1 Syrphid fly species that are most important to farmers and gardeners are active predators as larvae.

Pupae (around 1/2 inch long) form after larvae attach themselves to vegetation, bark, or a stationary object and become enveloped in a teardrop or bulb-shaped case. They are leathery or paper-like in texture with small posterior bumps (Fig. 2).

Fig. 2 Pupae have two rear protrusions (shown by arrow).

Adults are diversely colored, ranging from light green, yellow, orange, red, or black and are often patterned. Their coloration may resemble bees, bumble bees, hornets, or wasps, but they cannot sting or bite. Instead, this mimicry protects them from cautious predators as they dart from flower to flower (Fig. 3). They are easily distinguished from bees and wasps with a little further examination (Table 2). Most species are between 1/4 to 3/4 inch long.

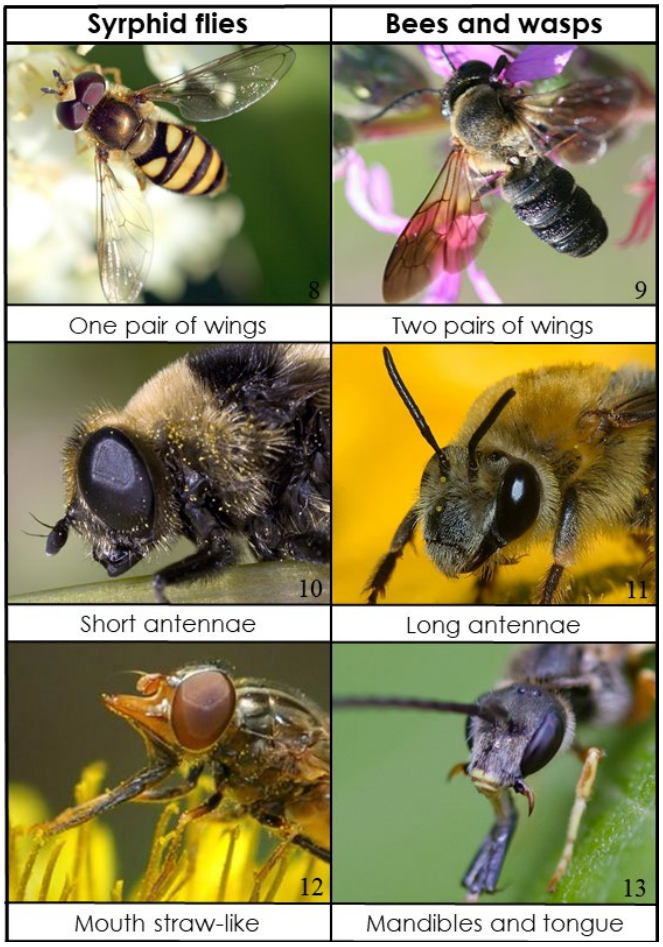
Fig. 3 Syrphid flies are often bee (right) or wasp (left) mimics with similar body forms and boldly contrasting patterns.

LIFE HISTORY

Syrphid fly adults are present throughout the growing season whenever conditions allow. Seasonal timing, temperature, time of day, and weather can all affect activity. Mating can occur during flight or on flowers. Males of some species are aggressively territorial to other males, some species' males perform "lekking" displays to attract females, and other species' males aggregate to attract mates. Adult females often lay over 100 eggs across their lifespan with some species laying over a 1000.

The overwintering stage is dependent on the species but typically occurs as mature larvae. Occasionally fertilized females are the overwintering stage. They can produce one (univoltine) to many (multivoltine) generations per year depending on the species.

Table 2 Syrphid flies appear superficially similar to bees and wasps with the exception of a few key differences.



Foraging: Predatory larvae can be active day or night. Using their head to feel around, they move blindly while actively hunting. When a suitable soft-bodied insect is found, an internal set of hook-shaped jaws are protruded from the mouth to capture prey (Fig. 1). Small, black, tar-like droppings, sometimes called "syrphid smears," are the only sign left behind by the larvae after feeding voraciously on hundreds of prey (Fig. 4).

Adult syrphids primarily feed on either pollen, nectar, or both. They may also consume honeydew, a sugary secretion from aphids.

Fig. 4 "Syrphid smears" are left behind on plants by larvae.

PROMOTING BENEFICAL INSECTS

Syrphid flies are not sold commercially, but they are common residents in fields and gardens. Instead, multiple strategies can encourage natural syrphid fly populations.

Pesticide Reduction: Insecticide applications not only reduce pest populations but also harm beneficial insects and other arthropods. This complicates pest control since pest populations tend to recover much more rapidly than their predaceous counterparts. Because of this, insecticide applications can increase pest damage long-term by repeatedly removing beneficial predators that would otherwise control pests. Reducing the use of broad-spectrum insecticides (e.g., carbaryl, chlorpyrifos, lambda-cyhalothrin, etc.) can help conserve predators of pests as well as pollinators. By using good judgment if pesticides are used, we can avoid disrupting the natural predation that keeps pest populations to acceptable levels long-term. When required, "soft" insecticides (e.g., horticultural oils, spinosad, *Beuvaria bassiana* products, etc.) are less damaging to predator populations. Spraying late in the evening can also help mitigate injury to pollinator populations such as adult syrphid flies, beetles, bees, or butterflies.

Conservation: Habitat plantings can attract and improve naturally occurring populations. The plants provide shelter and prey for larvae while the flowers provide pollen and nectar for adults. This is especially important early in the season to help boost local syrphid fly populations before primary pest populations become abundant on the target crops. Syrphid fly adults generally prefer the shallow open flowers of the aster, buttercup, mustard, carnation, rose, and parsley families feeding with their relatively short mouthparts. However, some, such as *Eristalis* species which are common in Utah, can feed on deeper tubular-shaped flowers due to their elongated mouthparts. Other plants attractive to syrphid fly adults being used in some areas include buckwheat (*Fagopyrum esculentum*), coriander (*Coriandrum sativa*), fennel (*Foeniculum vulgare*), phacelia (*Phacelia tanacetifolia*), sunflowers (*Helianthus* spp.) sweet alyssum (*Lobularia maritima*), white mustard (*Brassica hirta*), and yarrow (*Achillea millefolium*) among others.

SUMMARY

Syrphid flies are a diverse family of insects which can provide both biocontrol and pollination services. While not available for purchase, natural populations can be conserved through wise insecticide use practices and enhancing floral resources. Beneficial insects, including syrphid flies, are a useful tool for home gardeners and commercial agriculturalists alike to keep damaging pest populations to a minimum.

ADDITIONAL RESOURCES

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IMAGE CREDITS

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