



Flies: Nuisance or Beneficial?

Flies come in many shapes and sizes. This diversity encompasses many species and each has a slightly different habitat preference and breeding cycle. Several species of flies commonly enter Arizona homes. Most are merely nuisance pests especially if you have horses, livestock or poultry. Others can transmit disease and some are pollinators.

- **House flies, face flies and blow flies** develop in manure, carrion, and garbage and are commonly contaminated with disease-causing bacteria, including those associated with food poisoning.
- **Stable and deer flies** feed directly on domestic animals for blood meals, but in the absence of these hosts, they will feed on people, and are a constant challenge for horse owners.
- **Robber flies** are known for their predatory behavior and are common in riparian areas and sunny areas where prey insects congregate. Adult robber flies attack and feed on moths, butterflies, cicadas, wasps, bees, dragonflies, grasshoppers, other flies, some spiders, and a variety of other insects. Robber flies are considered a beneficial species.
- **Bee flies** are also considered beneficial as they pollinate many species of flowering plants. While they do not land on the flower, they do carry some pollen from plant to plant. It is thought they are just as efficient pollinators of some types of flowers as are the bees and they are more frequent visitors so, in the end, they may pollinate more flowers than bees.

Fly life cycles are similar, but vary in their breeding times and food preferences. In general, after breeding, female flies lay eggs which hatch into larvae (maggots) that feed on the various food sources listed above. Once mature, the larvae migrate in search of a place to pupate (the resting stage where the larva is transformed into an adult insect). Adults emerge to breed and feed. The entire life cycle is often completed in 7 to 14 days, but this depends on fly species and environmental conditions.

Let's explore the habits of some of the flies mentioned above.

Stable fly (*Stomoxys calcitrans*) adults are similar to the house fly in size and coloration. The adult stable fly is about 1/4 inch long. The two species can be differentiated by examination of the abdomens and the mouthparts. Adult stable flies have seven circular spots in a checkerboard pattern on their abdomens and house flies have an unpatterned abdomen. Stable flies have long, bayonet-like mouthparts for piercing skin and feeding on blood, whereas house flies have sponging mouthparts for feeding on liquids.

Stable flies develop in soggy hay, grasses or feed, and piles of moist green material. Proper care and management of waste feed and manure can greatly reduce or eliminate fly populations in these areas. Stalls should be cleaned of droppings daily and the manure spread thinly (not more than 1 to 2 inches deep). The choice of bedding is also very important. Hay or straw absorbs urine and decomposes rapidly and unless it is changed every few days will produce flies by the thousands. A far better material is wood shavings, which, when cleaned of manure daily and changed approximately every two weeks, does not normally breed flies.



Stable fly (Pavel Krok, Wikimedia).

Robber flies are medium to large (3/8 to 1-1/8 inches) flies that are often observed on stems of plants, on the ground or flying low. Species vary in appearance and some mimic wasps and bees. Most species are gray to black, hairy-bodied, have a long, narrow, tapering abdomen containing segments that may be banded, patterned or contrasting in color. The heads of adults have a depression between the large compound eyes when viewed from the front. Robber flies have long, strong legs that are bristled to aid in prey capture. Males and females are similar in appearance with females having slightly broader abdomens.

Female robber flies deposit whitish-colored eggs on low-lying plants and grasses, or in crevices within soil, bark, or wood. Egg-laying habits depend on the species and their specific habitat; most species lay their eggs in masses, which are then covered with a chalky protective coating.

After hatching, robber fly larvae live in the soil or in various other decaying organic materials that occur in their environment. Larvae are also predacious, feeding on eggs, larvae, or other soft-bodied insects. Robber flies overwinter as larvae and pupate in the soil. Pupae migrate to the soil surface and emerge as adults, often leaving behind their pupal casing. Complete development ranges from one to three years, depending on species and environmental conditions.

Robber flies generally establish a perching zone in which to locate potential prey. Perching height varies by species, but generally occurs in open, sunny locations. Robber flies can seize their prey in flight and inject their victims with saliva containing neurotoxic and proteolytic enzymes. This injection rapidly immobilizes prey and digests bodily contents. The robber fly soon has access to a liquid meal, which is generally consumed upon returning to a perched position.

Robber flies are not picky about their meals. This presents a dilemma to the informed gardener because they will dine indiscriminately on those insects we gardeners consider beneficial. On the other hand, they do eat harmful pests just as enthusiastically. Overall, robber flies are considered to play an important role in maintaining a healthy balance in our gardens and in wildland ecosystems.

Bee Flies are in the family Bombyliidae which consists of hundreds of genera – most of which have not been extensively studied. Being flies, they have a complex metamorphosis starting life out as an egg which hatches to become a larva (in flies it's called a maggot) and after feeding, it becomes a pupa where the larva undergoes changes to become an adult bee fly. This all sounds very simple and normal, but with the bee fly its lifecycle is not what you'd expect.

Bee flies resemble small bumblebees. Upon closer inspection, bee flies have a hairy body with long hairy legs with a long, slender tongue which they use to forage for nectar whilst hovering and darting amongst flowers. Bee flies are much more aerobatic in flight than bees and other winged insects. Bees have four wings and must land on a flower to forage. Bee flies (and other flies) have only two wings. Other characteristics of bee flies are large eyes, very short antennae, and many have a stiff and long proboscis, which they use for probing into flowers to sip the nectar while hovering in front of them.



Robber fly (*Triorla interrupta*, Whitney Cranshaw, Colorado State University, Bugwood.org)



Robber fly eating a cicada, Prescott, AZ, June 2007



Greater bee fly (*Bombylius major*), (David Cappaert, Michigan State University, Bugwood.org).

Adult bee flies begin to fly in early spring as temperatures warm and flowers start to produce nectar. Many species of female adult bee flies have been observed laying or flicking their eggs into and near the nesting entrances of ground nesting solitary bees. Once in the tunnel, the egg hatches and the worm-like maggot crawls into an open host cell where it remains inactive until the host larva is about to pupate. The bee-fly larva then becomes a maggot-like ectoparasite and attaches to the outside of the host (the solitary bee larva), gradually sucking out the body fluids. The pupal stage is variable, but some will overwinter. The adults exhibit courtship rituals - males hover and exhibit territorial behavior which includes darting at rival males and spinning at females. Some species are known to parasitize other ground nesting insects such as wasps, hornets, beetles, grasshoppers, moths, butterflies, and flies. Insect biology can be much stranger than fiction.



Grasshopper bee fly (Systoechus sp.),
(David Cappaert, Michigan State University, Bugwood.org).

Fly Management - Sanitation practices that remove breeding areas are fundamental to the control of filth-breeding flies, such as house flies and blow flies. Remove or cover garbage and clean spilled animal feed and manure. However, face flies, which typically develop in pasture lands, and cluster flies (earthworm parasites) often are difficult to control by breeding area management.

Screening and other exclusion techniques can be an important management tool for several types of indoor fly problems. Caulk or cover all openings into a home to prevent flies from entering. Several types of traps for flies also are available and can supplement other controls. Fly paper and electrocution light traps can kill flies but are effective only in areas where exclusion and sanitation efforts have already reduced the fly populations to low numbers.

Various food-based traps also are for sale. These traps often contain a protein and/or sugar-based bait, sometimes with the addition of a pheromone (sex attractant) used by flies. As with other traps, they can supplement other controls such as sanitation and exclusion. These traps are effective for species that breed on carrion and garbage such as house flies and blow flies and should be placed near the highest concentration of flies. Pesticides are also available for fly control, but should be used in conjunction with prevention, exclusion, trapping, and cultural strategies listed above.

Fly parasites can also provide biological control in problem areas such as stables and livestock feeding areas. Common fly parasites are small wasps that lay eggs on the pupae. These eggs hatch and the wasp larvae feed on the developing fly pupae. These insects can be ordered from vendors that sell beneficial insects. The wasps do not breed as fast as flies and similar other biological control strategies will not provide 100% fly control. They must be used with prevention, exclusion, and trapping strategies listed above to have the greatest effect on fly populations. If you are thinking of trying biological control, release them in late spring so that they have the ability to become established. If pesticides are used in conjunction with biological control, make sure you are not negatively impacting the wasp parasites.

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