

EYE GNATS

Integrated Pest Management for Home Gardeners and Landscape Professionals

Eye gnats, including *Hippelates* and *Liohippelates* species, can be severe nuisance pests that potentially transmit disease. *Liohippelates collusor* is the most abundant species found naturally in California, and it occurs in parts of the southwestern United States, northern Mexico, and other tropical and subtropical regions of the world. In Southern California, it's found in many desert areas but isn't a severe pest, except when occasional heavy rains result in large increases in the insect's population.

Eye gnats have become more of a problem for humans and our domesticated animals as a result of increased agricultural activities, particularly those activities where plant waste is tilled into the soil prior to replanting of fields. Eye gnats dispersing in high numbers from crop production fields into nearby residential communities, schools, parks, and golf courses may cause a nuisance.

IDENTIFICATION

Eye gnats (Figure 1) are small flies, 1/16 to 1/8 inch long, with shiny black or gray bodies and yellow to orange-brown legs. Eye gnat wings have reduced wing venation and lack colored spots or patterning. The adult female will persistently attempt to feed around eyes and wounds, helping to distinguish eye gnats from other small flies that are not attracted to eyes, such as fungus gnats.

While eye gnats are attracted to animals to feed, they cannot make wounds to feed on blood, setting them apart from the many other small flies that do bite animals, such as black flies and biting midges (sometimes called no-see-ums). You will rarely encounter adult males, which do not feed on eye exudates or other animal secretions

and are therefore not a nuisance to humans and animals.

LIFE CYCLE, BIOLOGY, AND BEHAVIOR

Eye gnats breed and develop in moist, well-drained sandy soils with abundant organic matter. Eye gnats aren't strong fliers, but they may be found several miles from breeding sites because their small size allows the wind to easily carry them. In warm, dry regions, eye gnats may be present year-round. Ideal temperatures for eye gnat activity and reproduction range from 70° to 90°F, but this insect can survive much colder temperatures. Studies have shown that temperatures below 70°F slow their activity and development. The length of their life cycle (Figure 2) varies, depending on the availability of food, temperature and moisture, but averages about 28 days.

Adult female eye gnats feed on animal sweat, sebaceous secretions, pus, or blood in order to obtain proteins needed for egg production. Eye gnats don't bite (tear or break intact skin), but have mouthparts that act like sponges to soak up bodily secretions. Female eye gnats have curved spurs on the hind legs to scrape the skin, increasing the flow of some body secretions.

Females begin to lay eggs within 5 to 8 days after hatching, laying the eggs below the surface of freshly turned soil in groups of up to 50 eggs. The female may lay 200 to 400 eggs in 2 to 3 days. The eggs are about 0.5 mm long with a lengthwise ridge and are pearly white (Figure 3). Eggs hatch in two to four days, producing maggotlike larvae (Figure 3) that immediately burrow into the soil and begin to feed on decaying organic matter and roots.

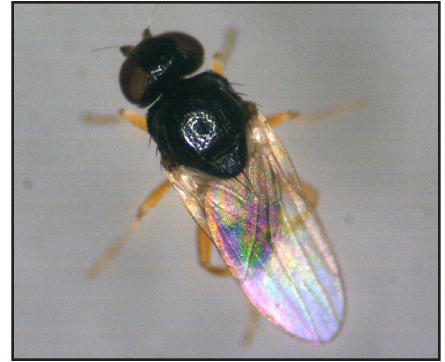


Figure 1. Eye gnat adult.

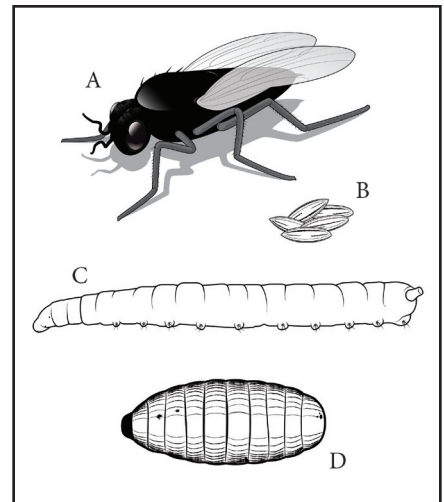


Figure 2. Eye gnat life cycle: adult (A), eggs (B), larva (C), and pupa (D).

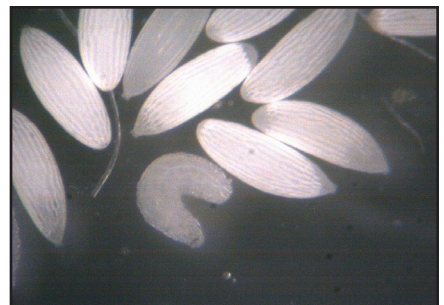


Figure 3. Eye gnat eggs and larva.

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After 5 to 20 days, the larvae pupate (Figure 4) close to the soil surface, where they remain for 5 to 10 days before emerging as adults.

PROBLEMS FOR HUMANS AND ANIMALS

The primary importance of the eye gnat as a pest results from the female's feeding habits. Although they don't bite or pierce the skin, females crawl over the skin and feed at the eyes, nose, and mouth, or at open wounds. The females are very persistent, so brushing them away is ineffective. The resulting annoyance can discourage outdoor recreation and affect the quality of life for residents who live near breeding sites. Eye gnats can have an economic impact by reducing tourism, discouraging development, and reducing worker productivity. Eye gnats also can potentially spread organisms that cause diseases.

MANAGEMENT

Control of eye gnats requires an all-encompassing approach targeting primarily larval development sites while also monitoring and in some cases managing adults. Temporary relief from eye gnats can be achieved by using the same repellents used for other nuisance pests such as mosquitoes (e.g., products containing the chemical DEET or picaridin). The most effective control measures are cultural and physical, but mass trapping to remove large numbers of flies has also been used by vector control districts.

Chemical control of eye gnats has been relatively ineffective in agricultural settings, due to insecticide resistance and the difficulty of reaching larvae beneath the soil with pesticide applications. If populations of eye gnats are very high around the home, applications of insecticides to turf, or to the surrounding landscape where adult eye gnats settle, may be effective in temporarily reducing the number of adult flies. Although there are beneficial parasites and predators of larvae and pupae, they are not effective in reducing eye gnat populations, and there are no commercially available biological control agents for this pest.

Cultural and Physical Control

The most effective control has been cultural and mechanical control at breeding sites, often on farms located some distance from homes, schools, and recreational areas where flies are bothering people. However, homeowners can use some cultural and physical methods to reduce an eye gnat nuisance.

For instance, eye gnats are attracted to, and reproduce in, fresh organic matter turned into the soil. Therefore, reduce the incorporation of organic matter into your soils and flowerbeds. In addition, the soil needs to be moist, so reducing the amount of moisture or irrigation, especially to the soil surface, will help reduce egg laying and larval survival.

Physical exclusion includes the use of insect exclusion screens or netting as a barrier or enclosure, which can be used as an option if eye gnats become unmanageable. Research has shown that more than 90% of the eye gnats can be excluded from an area using a screen fence or barrier that is 8 feet high, because eye gnats tend to fly close to the ground.

Trapping

Trapping can provide some relief from eye gnats when coupled with the use of repellents. Traps also can help determine the presence and relative population levels of eye gnats in the surrounding environment. An eye gnat trap (Figure 5) can be made by homeowners, gardeners, and landscapers with eggs (bait), a 2-liter plastic bottle, a 1-gallon container, and a knife or 3/4-inch drill bit:

1. In the 1-gallon empty plastic container, crack 4 eggs, fill the container with water, and mix thoroughly. Use the egg-bait solution immediately, refrigerating any that remains after filling the traps.
2. Cut or drill three to four holes into the upper third of the 2-liter plastic bottle.
3. Note that traps with the lower portion painted flat black are more effective.
4. Fill the 2-liter plastic bottle one fourth to one third full with the egg-bait solution.
5. Hang the trap 2 to 3 feet from the ground, placing the trap away from windows, doors, and patios of homes or work areas.
6. Check the trap at least once a week to make sure that there is still sufficient wet bait to catch flies.
7. It has been shown that two-week-old egg bait becomes ineffective. Therefore, remove the contents of the trap, clean, and refill at least every 14 days, or more often if possible. During hot periods, the water will evaporate and the bait will harden. If this occurs, add new egg bait as necessary.



Figure 4. Eye gnat pupa.



Figure 5. Eye gnat trap.

Chemical Control

Insecticides are rarely, if ever, warranted to control these flies around homes. However, if you do apply an insecticide for eye gnats, consider using pyrethrins or spinosad, which research has shown are effective against adult eye gnats. Eye gnat adults tend to spend most of their time in turf and flowerbeds when the populations are high, so treating these plants may reduce adult populations on site.

Insecticide treatments to kill larval populations in the soil are ineffective, but drying soils out will reduce egg laying and adult emergence. If populations of eye gnats on your property are very high, call your local county vector control district.

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WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original, labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Pesticides applied in your home and landscape can move and contaminate creeks, rivers, and oceans. Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down the sink or toilet. Either use the pesticide according to the label, or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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