



BUG BIZ

Pest Management and Insect Identification Series



Solenopsis invicta, Red Imported Fire Ant (Hymenoptera: Formicidae)

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Description

Adults of the red imported fire ant possess foreparts that are dark red to reddish brown in color with black abdomens (gaster). Workers vary greatly in size and may be 1/16 to 1/5 of an inch (2.5-5.0 mm) in length. They have a small segment between the abdomen and thorax with two distinct nodes present. The thorax is narrow compared to the gaster and head. Male and female reproductives (alates) differ greatly in appearance (sexual dimorphism). Female alates possess prominent mandibles similar to the sizes found on workers and are similar in color, with black abdomens and reddish colors on other body parts. Male alates have much smaller heads, reduced mandible sizes, no stinger and are solid black in color. Both male and female alates possess wings that fold over one another, are flat above and extend beyond the abdomen. Fire ant larvae are rarely seen unless the mound is disturbed. They appear as pale, plump, legless grubs concentrated in brood areas in the central part of the mound. Pupae strongly resemble adults, with the exception of the legs and antennae, which are held closely to their bodies. Pupae begin white but turn darker as they get closer to eclosion into adults.

The ranges of several additional species of the genus *Solenopsis* overlap with that of the red imported fire ant. Native fire ants are not considered serious pest species but can be similar in overall appearance. Examination under a microscope is required to identify individuals to species.

Life Cycle and Behavior

Adults of red imported fire ants aggressively defend nests. When their nest is disturbed, workers scale the area, then bite and sting anything they view as a threat. Red imported fire ant mounds are typically 8-12 inches (20-30 cm) high and dome shaped. Members of this species also frequently nest in rotten wood, buildings and under concrete. The life cycle of the red imported



Solenopsis invicta male alates dead en masse after mating flight (6legs2many, World Press, used with permission).

fire ant is similar to that of other ant species and consists of four stages, egg, larva, pupa and adult, with all immature stages occurring within the nest. After larvae hatch, they are fed by workers throughout their development. Larval growth consists of four individual stages, also known as instars. The larval stage lasts seven to 10 days. By the fourth larval instar, larvae are able to ingest solid food. Larvae then molt into pupae. Larvae typically develop into sterile worker ants, which are female and wingless. Workers are tasked with caring for the queen and brood, constructing and maintaining the nest, defending the colony, and gathering food and water. However, during developmental phases, some larvae are fed additional food. These larvae will grow significantly larger than the workers and will become reproductive members of the colony.

Reproductives usually are produced during the spring. They reside inside the nest until conditions are optimal for a mating (nuptial) flight. These flights typically occur in late afternoon but can occur during early morning hours. Conditions that are conducive for mating flights are temperatures between 70 and 90 degrees Fahrenheit and within 24 hours after rainfall when humidity is still high. Males die after copulation, while fertilized females rip off their wings and burrow underground, where they begin to lay their first eggs (usually about a dozen). The first brood of eggs is cared for by the queen and hatch between one and three weeks after they are deposited. All eggs laid develop into the first generation of sterile female workers. After this first generation, the queen is solely tasked with laying eggs and is no longer responsible for taking care of the brood. Once the queen is supplied with food and water by the workers, she can lay up to 800 eggs per day for up to seven years. Eggs typically reach adulthood within 15 days of being laid, and established colonies usually contain between 100,000 and 500,000 individuals.

Pest Status

Red imported fire ants are native to central South America and were introduced via shipping somewhere along the Gulf Coast of the U.S. during the 1930s or 1940s. The species quickly became a major ant pest throughout the southern United States and has expanded northward as far as Arkansas and Virginia. Red imported fire ants are also present in California.

Fire ants pose a serious risk to human health. Their stings can be fatal to those who experience allergic reactions and to others who experience a large number of stings. Fire ants bite and sting, typically seizing the skin using the mandibles, pulling up and inserting the stinger beneath the curled abdomen. The stinger injects venom



Solenopsis invicta, typical roadside fire ant mound, West Feliciana, Louisiana, diameter across base approximately 14 inches (C. Carlton).



Solenopsis invicta worker/soldier (Mario David Bazan. PIAT. Creative Commons v.1.0).



Solenopsis invicta workers surrounding four alate females (Connor Foley, [Researchgate.net](https://www.researchgate.net), Creative Commons v4.0).



Solenopsis invicta male alate (JC Jones. [Bugguide.net](https://www.bugguide.net). Creative Commons v.1.0).

consisting of alkaloids and several kinds of allergenic proteins that cause local pain, itching and swelling with a pimplelike sting mark on the victim's skin. They are a risk to pets and wildlife and have been responsible for substantially reducing the populations of some ground nesting birds, rodents and reptiles. They also deplete reptile populations by killing and competing with other ant species that are a staple food source of species, such as the Texas horned lizard (*Phrynosoma cornutum*), which is heavily dependent on harvester ants (*Pogonomyrmex* sp.).

Fire ants can nest in a wide range of locations from forests to urban environments but prefer open edge areas in forested habitats. If left unchecked or untreated, colony numbers will multiply. During rainfall, colony rafting behavior can allow for colony dispersal across considerable distances of flooded land. Total economic damage from fire ants is roughly \$6 billion annually, with more than half the total economic damage being residential homes. However, only \$500 million in economic damage within the agricultural sector can be attributed to fire ants. Fire ants also attack natural predators of agriculturally important plant pest insects. Some research has suggested that fire ants can be used as biological control agents in cotton, sugarcane and soybean farms to mitigate various agricultural pest insects; however, negative impacts on nontarget species, such as natural predators of those same pest insects, is likely to outweigh any benefits of fire ants.

Control

Biological control. Various options are available for both residential and agricultural control of the red imported fire ant. The least effective control strategy is biological control by parasitoid flies (*Pseudacteon curvatus* and *P. tricuspis*) in the family Phoridae, protozoa (*Thelohania solenopsae*) and various fungi. Biological control has thus far been ineffective at mitigating fire ant populations on a large scale.

Chemical control. Because mechanical control measures are not effective and biological control is only minimally effective, most fire ant control is chemical. The three general application methods include perimeter treatment, direct application and broadcast treatments. Perimeter treatment is applying an insecticide with high residual activity, which means it is slow to break down in the environment, around the perimeters of homes or facilities so that it may come in contact with any ants and other insects that walk over the insecticide barrier. This method is not an immediate kill but will slowly act on the ant's physiology, killing the ones that came in contact with

the insecticide. However, perimeter treatments do not eliminate ant colonies. Direct contact via pressure injection of insecticide into the colony or diluted insecticide application to the colony mound have been used with some efficacy in colony elimination. Despite the direct contact, colony mound applications do not always reach the queen and are not always effective. Pressure injection has more efficacy but is more expensive and rarely used. The most effective strategy is bait application for colony elimination. Baits can be applied on top of the colony or as a broadcast treatment across an entire residential yard or even large pastures if needed. The advantage to baits is low cost and the ability to target and kill the queen, resulting in colony elimination. The main disadvantage is that baits are relatively slow acting, requiring transport back to the colony by foraging workers, followed by distribution to nest mates and, eventually, the queen.

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