

# The Ant from Hell – *Solenopsis invicta*

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## Introduction and spread...

Introduced from western Brazil (Argentina or Paraguay), this fire ant species quickly and usually becomes the number one fire ant pest wherever it occurs. When it was introduced into the United States about 60 years ago, its natural enemies were left behind in South America.

Since 1958, over 7,100 compounds have been evaluated for delayed toxicity against just this ant by the USDA Agricultural Research Service.

*Solenopsis invicta* is associated with disturbed habitats, mostly created by humans, and is abundant in fields, pastures, lawns, and other open sunny areas. It inhabits fields used for agricultural purposes where its large above-ground mounds create problems in planting and harvesting crops. In areas where grass is periodically cut, mounds are flush with the ground and are hard to see. This fire ant species is rarely found in mature forests and other areas with heavy shade, unless part of the area has been disturbed or opened by fire or storms. *Solenopsis invicta* has the most toxic venom of all U. S. fire ants.

After World War II, the spread of fire ants was largely due to the sale of grass sod and woody ornamental plants used in landscaping. Fire ants include a large group of reddish-brown to black ants that normally spread by one of the following methods: seasonal relocations, migration in nursery stock, natural flights, and after floods rafting on water. Ants can be blown by the wind five miles or more during mating flights. They can “hitchhike” on birds or mass together to form a floating ball to ride out a flood.

## Problems caused by fire ants...

### Attacking humans and other animals...

Fire ants are so called because their fiery venom. They latch on with barbed mandibles and sting multiple times with spiked tails, injecting poison each time. Their venom is injected by a stinger like a wasp’s, and creates a burning sensation and a small bump or pustule within 8–24 hours that can last for up to 10 days. Fire ants in the United States are active and aggressive, swarming over anyone or anything that disturbs their nest, be it wild animals, domestic animals and birds, pets or people. An encounter with a fire ant nest can leave a lasting memory of burning pain, followed by tiny, itching pustules and sometimes even more severe reactions including anaphylactic shock.

A person who stops to stand on a mound or one of its tunnels, or who leans against a fence post included in the defended area, can have hundreds of

ants rush out to attack. Typically, the ants can be swarming on a person for 10 or more seconds before they grab the skin with their mandibles, double over their abdomens, and inject their stingers. This does not happen in their native land where the fire ants fear phorid fly species who only live to torture and kill fire ants. Phorid flies are being currently evaluated at the University of Florida in Gainesville.

Fire ant workers are sterile females that range in size from .08” to .2” in length. The larger workers are called *majors*, the medium sized are called *medias*, and the smallest size are called *minors*. All of these workers sting and inject a venom that causes blisters and allergic responses.

### Attacking plants...

Fire ants are pests in other ways besides their stinging. They can destroy or damage fruit and vegetable crops by feeding directly on the plants and/or by protecting other insects that damage the crops. The fire ants may feed on plant seedlings and germinating seeds causing crop damages. They chew the bark and growing tips of citrus trees and feed on the fruit.

### Other damages...

Fire ant mounds can break equipment and interfere with farming and mowing operations and turn ornamental turf and recreational fields into aesthetically disfigured moonscapes. They frequently enter and nest in houses and are attracted to water and electrical wires and their associated magnetic fields or impulses. They can ruin gas pumps, transformers, traffic lights, air conditioners, heat pumps and other electrical equipment.

Fire ants have caused sections of roads to collapse by removing huge amounts of soil from under the asphalt. Fire ants can nest in air conditioners, traffic lights and other electrical connections, often causing disruption of service (they can be quickly removed if you carefully vacuum them out – put 1 tablespoon of talcum powder or cornstarch in your dry vac bag first).

Increasingly, fire ants have also been found nesting in water meter casings, computers, televisions, wall voids, around plumbing, and under carpeting in structures. Their presence inside can threaten pets, children and sleeping or bedridden people. The ants have also been found invading and chewing on insulation on wiring and moving soil into these areas causing power failures in outdoor electrical equipment, apparently attracted (like many ants) to the electrical fields or impulses. Infested sites include household electric meters, air conditioning units, traffic signal control boxes, and even airport runway lights.

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## Life in the colony

### Mounds

Mounds that are, on average, 10”–24” in diameter and 18” high. But larger fire ant mounds are not uncommon. They also may extend 6 feet underground or to the water table. A mound can contain from 80,000 to over 250,000 workers. They also build soil tubes on foundations of buildings. The primary function of mounds, beyond that of the simple ground nests of other ants, is microclimate regulation: to control temperature and humidity. The ants can maintain a temperature inside the mound much higher than that outside, allowing them to continue colony growth even during cool weather. They have a filtering system that admits only liquids into their digestive systems that even removes bacteria.

The fire ant mounds are symmetrical piles of excavated soil, rich in organic materials, laced with interconnected galleries and chambers. The soil below ground also contains galleries and chambers. During foraging periods only a small percentage of ants may be inside the mound; the rest are out gathering food. That is why early morning or night treatments of the mound are more effective.

### Reproduction

In the South, during the summer, usually after a rain, hundreds of winged fire ants (called *alates*) will ascend from their mounds to mate 300-800 feet in the air. The males quickly drop to the ground and die, their only purpose in life fulfilled. The females, now queens, drift downward to start new colonies; on a windy day, this may be as far as five miles or more away from the original colony.

If the queen lands on a suitable moist site, she removes her wings and digs a vertical hole from 2–5 inches deep. She seals herself off in this founding nest to lay eggs and to rear her first brood of workers. During this period she does not feed, instead utilizing reserves stored in her body.

The first worker brood takes about a month to develop; these are the smallest individuals in the entire colony cycle. Fire ants open the nest, begin to forage for food, rear more workers, and care for the queens. Hereafter, the queen or queens essentially become egg-laying machines.

Within 24 hours the queen begins laying eggs, normally only 10–15 in the first cluster. The queen ant can live up to 7 years and will produce 1,500 to 1,600 eggs per day throughout her life. Two months later there will be several thousand. In a year, a new colony can be 100,000 strong. The process can repeat up to eight times each summer, spreading the ants 20 to 30 miles a year. There can be 35 million

ants per acre that are constantly foraging and will eat anything that sits still for less than a minute – they will find it, kill it if they can, and then try to eat it.

### Development of the individual

Like all ants, an individual fire ant begins life as an egg, which hatches into a legless, grub-like larva. The larva is very soft and whitish in color. It is also helpless and depends totally on worker ants for food and care. The fire ant larva is specialized for feeding and growing, and almost all growth occurs during this period. As in all insects, growth is accomplished by periodic molting, or shedding of the cuticle (skin) using an enzyme zipper. Having reached its final size, the larva becomes a pupa in which various adult structures, such as legs, and in some cases wings, become apparent for the first time. The fire ant pupal stage is the transitional stage between the larva and the adult that emerges during the final molt. In insects in general, the adult stage is specialized for reproduction and dispersal; with ants, some adult individuals are capable of reproduction (queens and kings) and the remainder are sterile workers.

Fire ants are very adaptable and do well in both sandy and mild soils, and in the mucks of the Everglades. They are often found along beaches, which surprises many people. They are especially partial to sun and sandy soil.

Daniel Wojcik, an adjunct UF/IFAS scientist and a research entomologist with the USDA’s Agricultural Research Service, said, “People will have to learn to deal with fire ants over the long-term. The days of massive chemical treatments, I think, are pretty much over. We are working on introducing a number of organisms from South America to provide biological control for fire ants, maybe some diseases of the ant, some parasites, and probably eventually some predators. But none of those things are going to be the golden bullet.”

### Feeding Habits...

Fire ants are omnivores and will eat plant and animal material including mice, turtles, snakes, and other vertebrates, crops, plants, saplings, wildflowers, fruit, and grass, but they prefer insects.

The oldest and most expendable 20% or so of the colony’s fire ant workers leave the nest to search for food. They explore 50-100 feet from the nest with an efficient looping pattern. They can gnaw on soiled clothing. Although the worker ants can chew and cut with their mandibles, they can only swallow liquids. When they encounter liquid food in the field, they swallow it and carry it back to the nest. Solid food is cut to reasonable size and carried back to the nest. They prefer protein foods such as insects and

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meats, but will feed virtually on everything, including fruit, seeds, grease, butter, honeydew, plants, nuts, and so on. Queens are the first to be fed proteins, so any fire ant bait has to be protein-based.

Like other ants, fire ant workers share their food with their nest mates by regurgitating it so that it can be licked or sucked up as a liquid by other ants. In this way, most ants in the nest get fed equally. This food sharing is also why slow-acting poison baits can be an effective control tactic against fire ants. You can try using 1% or less borax or boric acid with 10% sucrose in water by ant colonies for three to four months – it may take that long to get control. Try using several (filled and drilled) 35 mm film capsules per nest or sponge pieces soaked with bait.

U. S. fire ants readily defend their mound. Disturbed or injured workers release alarm pheromones which alert the others. There are four major species, two native and two imported, found in the U. S. from the Carolinas to California.

## Trying to control fire ants...

*Talcum powder repels fire ants!*

### Biological controls

A number of biological enemies of the fire ants have been evaluated as biocontrol agents, including nematodes, bacteria, fungi, viruses, and microsporidia, but biological control has not yet a proven effective control tactic for fire ants. However, some show promise.

Among the most promising is one parasite (Phorid) fly from Brazil that researchers in Gainesville, Florida, have been researching. *Pseudacteon tricuspis* has been developed successfully on *Solenopsis invicta*. This fly and its cogener *Pseudacteon litoralis* have the peculiar habit of decapitating their living host and using the ant's empty head capsule as a pupal case. The fly takes 4–6 weeks to develop from egg to adult. They live only to attack and kill fire ants.

Another effective biological control is a nematode *Neoplectana carpocapsae*. In trials, one application has inactivated about 80% of treated mounds in 90 days.

There is another nematode that also can be used, *Steinernema carpocapsae*. There also is a protozoan disease called *Theohania solenopsae* and a workerless social parasite called *Solenopsis dagerrei*. Large colonies of Argentine ants will keep fire ants at bay because the two species will not co-habit or co-exist in the same area.

The straw itch mite, *Pyemotes tritici*, has also been shown to inactivate fire ant mounds. Three to ten applications at about two week intervals gave 70% control. Practical use of this mite for fire ant

control must await the development of more efficient methods of mass production and increased effectiveness. One big problem is that this mite is a pest of people and animals too – it bites and causes dermatitis.

### Why biological controls will probably not be readily available to the public

Once a natural enemy or pathogen is introduced to a small area, it spreads quickly on its own. Thus, no professional from the poison industry wants to develop these extremely safe and effective pest controls because there is no profit incentive. With chemical controls, reinfestation can be expected every 6 months.

### Water Controls

Boiling water has been added to individual fire ant mounds with varying degrees of success (make a hole in the mound before pouring the liquid in). Approximately 3 gallons of boiling water poured into each mound will eliminate about 60% of the mounds treated. Surviving mounds will need to be treated again. Or try using one gallon of orange/grapefruit juice, two gallons of water and a dash of dish soap on a sunny but cool day.

Spraying a mound with a hose may give you some degree of satisfaction, but it won't bother the fire ants. Area-wide flooding or prescribed burning of fire ant infested areas has proved ineffective, and may actually promote the establishment of new colonies.

When the water is too lasting and/or deep, fire ants have developed a unique method to keep from drowning. At first hint of rising water, worker ants gather the entire colony into a ball - sometimes as big as a basketball. As the water overtakes the mound, the ball rides the flood like a living raft, rolling in the water so all the members can take turns breathing. When they strike a solid object, be it a swimming dog or your canoe, they quickly swarm aboard. If sprayed or baited with diluted Kleen Kill® enzymes they will quickly die.

### Electrical Attractants

Electrical fields and/or impulses seem to attract fire ants; use this attraction to lure fire ants to your borax or boric acid baits or talcum powder or traps. Solar powered yard lights can be adapted to provide electrical current for a field attractant.

### Chemical controls

Fire ant workers compensate for changing conditions such as temperature and humidity by moving the larvae and queen to suitable locations within the mound. On cool mornings in the summer

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the queens are near the top of the mounds where it is warmer; as the day heats up the queens go deeper into the soil. So treat the mounds early in the morning for best results.

Locate ant activity inside a structure by watching the ant trail and follow it back to the void and treat with ant baits or dusts or diluted Kleen Kill® (also sold as Kleen'em Away Naturally) enzymes and peppermint soap, 2 ounces each per quart of water. Ants will kill plants by feeding on seeds or by girdling freshly planted nursery stock (you can stop their climbing with bands of Tanglefoot® or Vaseline® at the bases of the plants).

Whitmire Research Laboratories recently introduced PT 370 Ascend Fire Ant Bait® which contains 0.011% avermectin B1 in a highly attractive corn grit base saturated with protein oil. Avermectin is naturally derived from the soil fungus *Streptomyces avermilitis*. Ascend works both as an acute toxicant and as an insect growth regulator to quickly and effectively control fire ants. Foraging fire ants carry Ascend's dual action insecticide back to the mound. Ascend's stomach insecticide works slowly but surely to reduce the colony's population; be sure to allow enough time for its unique sterilizing property to be passed on to the queen. This causes the worker brood to eventually disappear, and the colony is ultimately destroyed.

## Other ways to control...

Where you can not safely use enzymes or steam or aerosol foam insulation to protect your house, you can spray the ants with WD40 or carefully vacuum them up (put talcum powder in the vacuum bag before beginning), or you can follow foraging ant trails (at night if needed, with a red light) to the nesting area and then you can treat these areas with talcum or medicated body powder or Comet® cleanser, or you can use some bands of Vaseline® or Tanglefoot® to trap them or keep them out of your house.

## The Feds try widespread chemicals and fail miserably

Beginning in the late 1950's, the federal government first declared war on fire ants stating it would attempt to wipe out *S. invicta* once and for all. World War II-era bombers dusted millions of acres in the South with the highly poisonous pesticides dieldrin and heptachlor. Some fire ants died, but so did birds, fish, raccoons, dogs, opossums, and cattle. The bird population declined over 85% in Texas and Louisiana. When the program was finally halted, the government had spent \$70 million. Before the campaign, *S. invicta* had only infested 90 million acres; five years later, it had

spread to 126 million acres!

In 1958, the Federal Fire Ant Quarantine was implemented try to limit the spread of fire ants from quarantined areas. Hay, sod, plants and used soil moving equipment must be inspected and/or treated before being moved out of the quarantine area. USDA, APHIS and PPQ mandate plants must be pest free but do not dictate treatment strategies, such as dusting with talcum powder.

Frustrated but undaunted, the feds spent another \$200 million in the 1960's for a new poison effort, with similar dismal results. A survey conducted in 1981 showed about 1 million households were using insecticide poisons and other controls including gasoline trying to eradicate fire ants. Today there are 157 chemical formulations registered for the control of fire ants – but none of these volatile, synthetic pesticide poisons has ever stopped their spread. Today the fire ant epidemic infestation count is over 300 million acres in the United States and Puerto Rico, and the number is growing!

## The benefits of fire ants

Believe it or not, fire ants are mainly beneficial insects, when they are left alone, because they are truly voracious predators that feed on pests such as fleas, filth breeding flies, horn flies, boll weevils, sugar cane borer, ticks, and cockroaches. The imported fire ant is credited with having dramatically reduced the range of the Lone Star Tick, a serious livestock pest. When left alone, this also may deter multiple-queen colony formations.