

Red Imported Fire Ant (RIFA)

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As of 2019, several Virginia counties and cities (see below for a list) were placed under the Federal Fire Ant Quarantine. For all practical purposes, the implementation of the quarantine means that the U.S. Department of Agriculture will no longer be responsible for controlling fire ant colonies within the quarantine areas. Therefore, it is important for citizens within the quarantine areas to become familiar with the risks associated with fire ants, and to learn how to properly control fire ant infestations.

Scientific Name

Hymenoptera: Formicidae, *Solenopsis invicta* Buren

Range in the United States

Red imported fire ant (RIFA) colonies can be found throughout the southeastern United States from Texas through Florida, extending as far north as Oklahoma, Tennessee, and Virginia. Fire ants have been transported west into New Mexico and California. Red imported fire ants are also established in Puerto Rico.

Size

Fire ant workers are polymorphic, meaning that they can be a wide range of sizes, typically 1.5-4 mm (1/16"-1/4").

Color

Workers and queen ants have a shiny reddish-brown head and thorax. The gaster (the last rear segment) is black. The male fire ant swarmers are completely black.

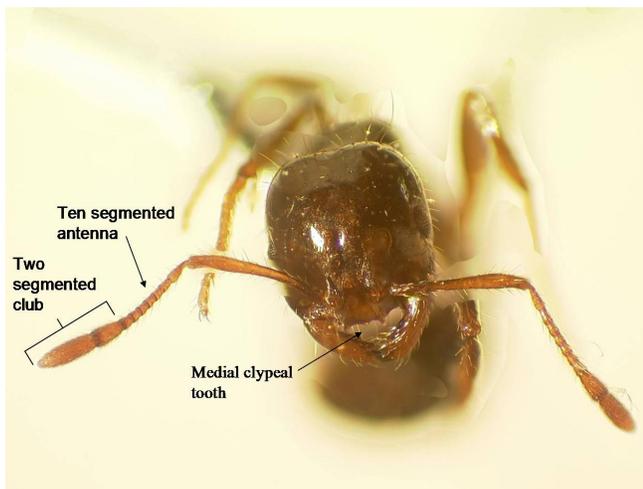
Description

A single red imported fire ant colony contains hundreds to thousands of polymorphic workers. Colonies also contain eggs, larvae, and pupae, as well as male and female reproductives. The fire ant colony has either one egg-laying queen (monogyne) or multiple egg-laying queens (polygyne). These queens no longer have wings. However, the colonies may also contain many winged, unmated females and males.

You can distinguish RIFA from other North American ant species by using a microscope to verify the following characteristics. First, each antenna has ten segments (starting at the head). The last two segments will be larger than the others, forming a two-segmented club. The pedicel (the skinny "waist" connecting the front of the body to the gaster) has two segments. Finally, the tip of the gaster has a sharp stinger that is easily visible with the aid of a microscope.



Polymorphic (variable size) fire ant workers feeding on a hot dog.



Identifying characteristics on the fire ant worker head: ten-segmented antennae with two-segmented club; and medial clypeal tooth.



Fire ants have a two-segmented waist, or petiole.

History

Currently, there are two native and two invasive fire ant species present in the United States. The two native species are the tropical fire ant, *Solenopsis geminata* Fabricius, and the southern fire ant, *Solenopsis xyloni* McCook. The two invasive fire ant species are the black imported fire ant, *Solenopsis richteri* Forel, and the red imported fire ant, *Solenopsis invicta* Burden. The black imported fire ant arrived in Mobile, Ala. around 1918. It is now found only in regions of Alabama, Mississippi, Georgia and Tennessee. The red imported fire ant was introduced in Mobile, Ala. around 1930 but has spread throughout the southeastern United States. Both invasive species are native to South America and were transported to Mobile, Ala. in cargo ships.

Of the four fire ant species present in the U.S., *S. invicta* is by far the most widespread and problematic. RIFAs have eliminated the two native species from most of their range. Even the black imported fire ant has been displaced by *S. invicta* in some of the areas of Alabama where it was established before the introduction of RIFAs. Interestingly, the black and red fire ants have been able to interbreed. The *S. invicta* x *S. richteri* hybrid currently inhabits some of the areas where *S. richteri* was displaced by RIFAs (Georgia, Tennessee). In most states, including Virginia, only the red imported fire ant is present.

Fire ants have spread within the United States both on their own and through human assistance. RIFA spread naturally via annual mating flights where male and female reproductives fly out of the nest, then mate and the new queens go off to start colonies of their own. Fire ants can also spread by “budding.” Budding is a process where one or more queens and a group of workers will move out of the parent colony and form a single or several new colonies in a nearby location. In areas that experience flooding, RIFA will form rafts of workers, with the queen and brood placed safely on the top of the raft. The entire colony will then float off to a new location.

However, none of these natural methods of dispersal result in the ants traveling great distances. By far the most effective method of RIFA dispersal has been human transport. For example, the most dramatic expansion of RIFA’s range occurred during the housing boom of the 1950s. This expansion was facilitated by the transportation of sod and nursery plants from infested production sites to new housing or commercial developments, often located in distant counties and states. The transport of infested plant material, mulch, and topsoil is still the most common method of RIFA range expansion.

The RIFA Mound

The RIFA nest, or mound is often noticed before the ants themselves. The mounds are often large and dome-shaped with hard, weather-resistant crusts. In Virginia, most RIFA are found in locations with sandy soil, so the mounds tend to look like piles of sand when they show up in someone’s lawn. The average size for a mature mound is 10-24 inches in diameter and 6-18 inches in height. In heavy clay soil, the mounds may be much larger, sometimes reaching 2-3 feet in height. Such mounds may have galler-



Cone-shaped fire ant mound in Suffolk, Va.



Fire ant mound in soybean field, Suffolk, Va.

ies extending as far as 4-6 feet underground. Fire ant mounds act as air conditioning units in the warm weather, heat sinks in cold weather, and staging platforms for mating flights. Mounds also provide an elevated refuge from flooding during periods of heavy precipitation. **Mounds are characteristic of RIFA, but are not essential. In some locations the mounds are very flat or nonexistent.**

Habitat

Fire ants prefer to construct mounds in areas that are open and exposed to the sun. They are often found in cultivated fields or pastures. They are rarely found in wooded locations with heavy tree canopy. In urban areas, they will nest in cemeteries, parks, playing fields, and yards. RIFAs will also nest within

the walls of structures and under sidewalks, concrete slabs, and roadways. Colonies have also been found inside cars, tractors, and recreational vehicles. RIFAs are attracted to electrical currents and will nest in and around heat pumps, junction boxes, traffic lights, and similar devices. Nesting RIFA have been known to cause electrical fires because they often chew on electrical wiring.

Fire Ants in Virginia

The red imported fire ant is a relatively recent invader of Virginia. RIFA were first collected from colonies located in Hampton, Va. in 1989. Fire ant colonies are now established throughout Hampton Roads. Individual RIFA colonies have also been documented in the greater Richmond area and as far west as Montgomery County. However, these occurrences are considered to be isolated infestations, where colony establishment has not been confirmed.

In response to the increasing fire ant population in the Tidewater area of Virginia, the U.S. Department of Agriculture (USDA) and Virginia Department of Agriculture and Consumer Services (VDACS) implemented the Federal Fire Ant Quarantine in 2009 (see list of quarantined counties and cities on page 9). The quarantine rules specify that it is illegal to ship plant material, sod, or mulch from areas known to be infested by fire ants to non-quarantine areas unless approved by the USDA. Shippers must have a cooperative agreement with the USDA (the agreement specifies the inspection and ant treatment protocols for all materials intended for shipment) in place before shipment. Most likely the single greatest impact that the quarantine will have on residents of the quarantine areas is that VDACS will no longer be responsible for treating fire ant mounds. Fire ant control will now be the responsibility of those citizens living and working in the quarantine locations. A current map of all quarantined locations within the U.S. may be viewed at https://www.aphis.usda.gov/plant_health/plant_pest_info/fireants/downloads/fireant.pdf.

Please note that RIFA infestations occurring outside of the quarantined areas in Virginia should still be reported to Virginia Department of Agriculture and Consumer Services, Office of Plant & Pest Services. To contact the VDACS Office of Plant & Pest Services, call (804) 786-3515 or visit the VDACS website at <http://www.vdacs.state.va.us/>.

Life Cycle

Like all ants, RIFAs have a complex life cycle involving several stages. The first is the egg stage. The eggs hatch into white, legless larvae that then transform into pupae before becoming adult workers or reproductives.

Reproductive swarms of virgin queens and males occur during the spring or summer but can occur at any time of year when the temperature is above 72°F. Healthy nests often produce two or more nuptial flights a year. It is typical for many RIFA colonies to participate in simultaneous nuptial flights when local weather conditions are favorable. Flights most often occur during the midmorning, one or two days after a rainfall. Most nests produce both male and female reproductives (swarmers). But the swarmers from a single flight from a single nest are predominantly one sex. Males emerge first and are already airborne



Fire ant workers transporting brood (eggs, larvae, pupae) to a new mound.

when the females take flight. Mating occurs in the air. After mating, the males die. The newly mated queens shed their wings and construct a brood cell (incipient nest) 25 millimeters to 50 millimeters below the soil surface. Often multiple queens will share a cell, but often only one survives to establish a colony.

The new queen lays 10 to 15 eggs that hatch in 7 to 10 days. The larvae are fed by the queen through trophallaxis (the mouth-to-mouth exchange of regurgitated,

digested food). Newly mated queens do not forage for food, but subsist on stored fat and nutrients produced from the degeneration of their flight muscles. The workers that develop from the first group of eggs are very small because of their limited food supply. These workers are called minims. The minims immediately take on the tasks of nest maintenance and foraging. The queen begins to produce larger workers soon after the minims start foraging for food. The larger workers usually start to appear within 30 days of the mating flight. The largest of these large workers (majors) may be 10 times the size of the minims.

After producing enough workers to take care of the foraging and nest expansion, the queen becomes an egg laying machine, producing 1,600 eggs per day, thus the colony grows rapidly. Because she is producing eggs every day, ants of all life stages (eggs, larvae and pupae, and adults) are present in the colony at once. The eggs, larvae, and pupae are collectively referred to as “brood.” Development of the brood takes place inside the nest with older workers tending and feeding their younger siblings. Within 6 months of founding, colony brood production will become so efficient that new workers will be produced on a daily basis. A healthy RIFA queen lives up to 7 years and a mature colony of RIFAs may contain over 250,000 ants.

The life cycle described above is typical for all RIFA, with the exception that many RIFA colonies have more than one queen. In fact, RIFA have two different colony forms: single queen colonies (monogyne) and multiple queen colonies (polygyne). The lifecycle of the multiple queen colony is similar to that of a single queen colony except that several mated queens work together to found the new nest. Polygyne colonies also grow at a much faster rate than single queen colonies because many queens are producing eggs at the same time.

Although both monogyne and polygyne colonies have been documented in the RIFA's native habitat (Central and parts of South America), the dominant colony form is monogyne. In the U.S., polygyne colonies thought to be the most common colony form. RIFA experts believe the predominance of the polygyne form in the U.S. may be the result of the founding effect, or genetic bottleneck, resulting from the few founding colonies originally transported into Alabama. Alternatively, the preponderance of the poly-

gyne from in the U.S. could be a reaction to environmental conditions, specifically the lack of competition or predation pressure from other natural enemies.

Types of RIFA Damage

The RIFA has been called the “ant from hell.” These ants are omnivorous, feeding on almost any plant or animal material, dead or alive. However, it should be kept in mind that the entire south eastern United States has been living with RIFA for many decades. Although the living with RIFA can be costly, inconvenient, and sometimes painful, these ants are not the murderous menace that many media stories would have you believe. Below, we discuss the negative impacts that RIFA can have on environments where they become established.

Wildlife

RIFAs feed on the seeds, fruit, shoots, and seedlings of numerous native plant species, thus reducing their reproduction, dispersal and yield. RIFA presence on plants also may interfere with the activity of natural pollinators and beneficial predatory insects. Fire ants also “tend” plant damaging insect pests such as scale insects, mealy bugs, and aphids. These insects feed by sucking the plant juices. The repeated stabbing of the plant with the insects’ mouthparts and the removal of the plant fluids damages the plant and transmits plant disease organisms. However, RIFA protect these insects from predators because they produce a sweet excretion (waste product) called honeydew. It is the honeydew that the RIFA uses for food. To maintain their honeydew food resource, RIFAs actively transport populations of these sucking insects to new healthy plants and protect them from other insect predators. However, RIFAs will also feed on their sucking insect population if it gets too large.

Fire ants also have a major impact on the ground-nesting animals in an ecosystem. Fire ants will often attack native ant nests, millipedes, centipedes and other ground-dwelling arthropods. While their preferred food sources seem to be insects and spiders, studies have documented at least a two-fold reduction in ground-nesting vertebrates (e.g. snakes, turtles, birds, etc.) where RIFAs are present. RIFA will attack reptile and bird eggs, nestling birds, and even adult reptiles, rodents, birds, and amphibians.

Agriculture

RIFAs are known to damage more than 50 cultivated plants by feeding on germinating seeds (e.g. corn, sorghum, soybeans) and damaging the developing flower buds or fruit (e.g. citrus, tomatoes). RIFA can also attack nursery stock and girdle the young trees. RIFAs foraging below ground have been known to cause significant damage to potato tubers and the subterranean pods of peanuts. Fire ants can be a particular problem during periods of drought, because they will often attack many cultivated crops in search of moisture. Not surprisingly, the presence of RIFAs in an agricultural field also significantly slow a farm worker’s ability to harvest fruits and vegetables by hand.

Fire ants also pose a threat to young or debilitated livestock that may not be able to escape fire ant worker attack. Calves born in the field may be stung repeatedly or even blinded by RIFA stings before they are able to stand up. The presence of fire ants in a field may also disrupt foraging livestock. Cows and horses can easily be stung in the mouth while attempting to graze in pastures where fire ant mounds are present.

Urban Environments

RIFAs rarely nest indoors, but if they do, you should call a professional pest control operator immediately. It is more typical of RIFA to establish nests next to or under sidewalks, roadways, and other outdoor structures. If the nest site is later abandoned, the soil may shift, causing cracks or occasionally the collapse of the sidewalk.



Fire ant nest inside of drainage pipe; Richmond, Va.

RIFA are a common nuisance around dumpsters, trash cans, kitchen gardens, and areas where pets are fed and watered. Fire ants can also be a threat to small, young or confined pets. Puppies and kittens playing outdoors should be supervised in locations where fire ants are present. Likewise, dogs tied in the yard must have enough lead to allow them to move 10 or more yards in any direction to escape a fire ant attack. Dogs confined in runs should never be tied up.

RIFA mounds in the yard are unsightly and will spread within a few months if there is no effort to eliminate them. However, the mounds must be treated properly or else the mound disturbance may cause the colony to split, resulting in two or three mounds.

Probably the most significant result of RIFA presence in the urban environment is the reduced enjoyment of outdoor activities. RIFA are a dangerous nuisance in yards, parks, ball fields, campgrounds, and school yards. Playing football or soccer on an infested field is simply impossible. Similarly, picnicking on a blanket in the park is also very difficult. RIFA are always foraging, and even sitting on the grass for a moment can result in one or two fire ant stings.

Fire Ant Stings

RIFA are extremely aggressive and respond rapidly to any disturbance of the nest or a food resource. Fire ants can bite their victims, but they are most famous for their painful sting. A RIFA stings by grasping its victim with its mandibles (jaws) and repeatedly jabs the stinger into the skin while pivoting around in a tiny circle. The result is a small, acutely painful wound that develops into a pustule (small, firm blister-like sore) in 24 to 48 hours. The pustules can become sites of secondary infection or even a permanent scar. A few people are acutely sensitive to fire ant venom and may have intense reactions to stings such as nausea, shock, chest pains, and, on rare cases, even death.

It has been documented that RIFA tend to enter structure during periods of heavy precipitation. RIFAs in structures can be very dangerous for small children or the elderly. A number of deaths have resulted from children or bedridden elderly adults being stung repeatedly by fire ants. Nursing homes and day care centers need to be particularly diligent about keeping fire ants controlled both indoors and out.



Fire ant response to their mound being stepped on.



The fire ant stinger.

Control

Individuals and commercial pest control operators residing outside of the quarantined area should not attempt to treat fire ant infestations. If you believe you have discovered a RIFA nest, contact VDACS Office of Plant and Pest Services (phone (804) 786-3515) immediately.

If you believe you have discovered a RIFA nest and live in the quarantine area, contact a pest control company immediately. Failure to eradicate an entire nest will result in the local establishment and spread of RIFA in a very short period of time.

The following section describing RIFA control techniques is to be used for fire ant control in the quarantine areas of Virginia. Individual mound treatments and baiting can both be employed to mitigate infestations in small areas (e.g., the area surrounding a single building or an urban playground). Whatever product you might choose to apply, please read and follow the label directions exactly. Improper pesticide applications have been responsible for a significant portion of fire ant spread within the U.S.

Individual Mound Treatments

When treating individual fire ant mounds, it is extremely important that the mound remain undisturbed prior to treatment. Drenches, dusts or granules must come in direct contact with the ants to be effective. Disturbing the mound may cause the workers to move the queen or even the entire colony to another location.

Individual mound treatments may take the form of a drench, where the mound is flooded with a large volume of liquid insecticide labeled for this purpose. This is the fastest acting method of fire ant management. Unfortunately, the queen may be located too deep in the soil to be destroyed by the insecticide, in which case, control will only be temporary. Injection devices to aid in the deep penetration of liquid insecticide are readily available for professional pest control personnel, but these devices are relatively expensive for homeowners to purchase. In addition, formulations of insecticide labeled for use as “injectants” must be formulated properly in a chemical-resistant container. Injecting a mound incorrectly can result in the insecticide drenching the applicator, or the applicator being attacked by thousands of angry ants. If you have doubts about your application equipment, your personal protective equipment, your insecticide application ability, or your willingness to endure ant stings, it is best to contact a professional or choose another method of treatment. **Fire ants are extremely aggressive when disturbed.**

Individual mounds may also be treated with a surface application of dust or granular formulation insecticide. Read the product label and apply these products according to the directions. Some granular or dust formulations may require that the product be applied around the mound instead of directly on it. Direct application to the mound often will anger the ants, caus-

ing them to run out. This behavior may or may not help the product work. Also, determine from the label if the product needs to be “watered-in.” Many dry formulations are more effective when they are watered into the soil. Dust and granular application are typically slower and less effective than mound drenching. However, they require no specialized equipment and are easier for the homeowner to use.

Never apply gasoline or other combustible materials to a fire ant mound. Attempting to drench RIFA mound with gasoline to incinerate the nest is dangerous, ineffective, and usually illegal. Typically, the gasoline volatilizes into the soil before it travels far enough into the nest to reach the queen. The typical results of burning an ant nest are singed eyebrows, a black spot on the lawn, and three more fire ant mounds appearing in the same location as the burnt one within three months. **If gasoline was an effective fire ant control method, the United States would have been free of fire ants decades ago.**

Baits

Individuals and commercial pest control operators residing outside of the quarantined area should not attempt to treat fire ant infestations. If you believe you have discovered a RIFA nest, contact VDACS (phone (804) 786-3515) immediately or <https://www.vdacs.virginia.gov/pdf/fire-ant-quar-map.pdf>.

For those people within the quarantine locations, a number of fire ant baits are available for both to pest management professionals and homeowners. While baits are generally much slower than direct mound treatments, they are safer and typically more effective if properly applied. Fire ant baits generally take the form of an insecticide suspended in oil and impregnated in an inert carrier such as corncob grit. Foraging worker ants find the bait, and ingest the oils off of the granules. The insecticide in the bait is typically slow acting so that foraging ants live long enough to carry the insecticide back to the nest and feed it to the rest of the colony via trophallaxis. Baits may be broadcast over large infested areas or concentrated in an area where fire ants are known to feed (e.g., around trash cans or vegetable gardens). In some cases it is possible to pre-bait an area with birdseed to attract foraging ants. Then the bait granules can be put out once the ants are feeding in the area. The use of baits is generally the most effective and least labor-intensive method for controlling RIFAs.

When broadcasting fire ant bait, it is important to remember that the product should be applied very sparingly. A high concentration of bait granules often repels foraging ants. Baits should never be applied directly to a fire ant nest. The workers will treat the bait as refuse rather than food and may move the nest entrance in response.

Baits do require some consideration with regard to weather conditions. As has been mentioned, baiting is relatively slow and ant bait retrieval is temperature dependent. Fire ants do not forage when the temperature is below about 65° F. They also forage very little during the middle of the day when temperatures are high (>85° F). Therefore, it is important to get the bait applied in the morning hours or in the evening around 6 p.m. (summer) when many ants are out foraging. The speed of control will be directly related to the number of ants that take the bait back to the nest. Also, because baits are water soluble, they must be reapplied after significant rainfall. It is wise to check the weather forecast to determine if you can put bait out without fear of it raining within the next 24 hours.

As a final note, remember that although most fire ant baits have relatively low toxicity, they are not specific to fire ants. Care must be taken in applying baits to avoid affecting non-target organisms. Always read the product label to determine where fire ant baits should and should not be applied.

Products Available in Virginia

Be sure to speak to a certified applicator about the products that should be used on your property. While many of these products are acceptable for application in yards and playgrounds, **they may not be labeled for use in horse pastures or agricultural land where food crops are produced.**

At this time, there are only a few effective consumer RIFA control products available in Virginia. But there are also several effective commercial products available to certified pesticide applicators within the state.

The only consumer RIFA products that are widely available are Amdro Ant Block® (0.88% hydramethylnon; Ambrands, Atlanta, Ga.), Amdro Yard Treatment® (0.036% hydramethylnon; Ambrands, Atlanta, Ga.) and Ortho Orthene Fire Ant Killer® (50% acephate; Scotts International B.V., Scotts Professional, Gel-

dermalsen, The Netherlands). Both of the Amdro® products are bait formulations. The Ortho® product is applied as an individual mound treatment.

Although the listed products are registered for use in Virginia, their availability within the state may vary. Before driving all over town to purchase a specific control product, call several stores in your area to see what products are available and meet your specific needs.

Some of the commercial use products registered for use in Virginia include Advion Fire Ant Bait (0.45% indoxacarb; DuPont, Wilmington, Del.), Amdro Fire Ant Bait (0.736% hydramethylnon; Ambrands, Atlanta, Ga.), Esteem Fire Ant Bait (0.5% pyriproxyfen; Valent USA Corporation, Walnut Creek, Calif.), Extinguish Fire Ant Bait (0.5% methoprene; Zoecon, Wellmark International, Schaumburg, Ill.), and Extinguish Plus Fire Ant Bait (0.25% methoprene/0.36% hydramethylnon; Zoecon Wellmark International, Schaumburg, Ill.).

Biological Control

There have been several attempts to control RIFA populations using biological control agents (e.g., endoparasites, ectoparasites, viruses, predators, and disease pathogens). While several agents have been released in the United States the effects of these releases is still under evaluation. It may take several years to determine if any of these agents can successfully eliminate populations of RIFA from a location. None of these biological control organisms have been released in Virginia.

Myths

Your grandfather may have told you that you could kill ants by feeding them grits. Supposedly, the ants would feed on the dry grits and then blow up as the grits expanded inside their bodies. However, this story is not true. Adult ants can only consume liquid food and would not eat grits, even though they may pick up a few.

Interesting Facts

Dr. Ted M. Freeman of the Wilford Hall Medical Center in San Antonio, Texas, has developed an whole-body extract of RIFA that has been successfully used to desensitize patients known to be allergic to RIFA venom. Unfortunately, the vaccine is not commercially available.

For more information on RIFA, please see the USDA Animal and Plant Health Inspection Service Imported Fire Ant website at https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/pests-and-diseases/imported-fire-ants/ct_imported_fire_ants.

Red Imported Fire Ant cities and counties under the Federal Fire Ant Quarantine (FFAQ)

Cities since 2009

- Chesapeake
- Hampton
- Newport News
- Norfolk
- Poquoson
- Portsmouth
- Suffolk
- Virginia Beach
- Williamsburg

Counties since 2009

- James City
- York

New cities under the FFAQ in 2019

- Emporia
- Franklin

New counties under the FFAQ in 2019

- Brunswick
- Greenville
- Isle of Wight
- Mecklenburg
- Southampton