



Imported Fire Ants

[*Solenopsis invicta* (Buren) and *Solenopsis richteri* (Forel)]

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Quick Facts

- Imported fire ants (IFA) represent two South American species: red imported fire ant and black imported fire ant.
- IFA occur in the southeastern U.S. and in parts of California and other western states. They are NOT known to occur in Utah, but parts of southwestern Utah are suitable for IFA establishment.
- IFA can cause agricultural, ecological, economical, nuisance, and public health problems.
- When a nest is disturbed, IFA will exit the mound in large numbers to bite and sting repeatedly, injecting painful venom with each sting.
- Stings can cause persistent “fire-like” pain and blistering pustules--which when broken can result in secondary infections and scarring--and allergic reactions, including rare instances of seizures and anaphylactic shock.
- Although IFA can spread naturally by flying short distances, long-distance spread is caused primarily by the movement of infested materials, such as baled hay and straw, nursery stock, grass sod, soil, honeybee hives, and vehicles and equipment.
- Five native *Solenopsis* ant species occur in Utah, but they are not known to be aggressive and their colonies are small and inconspicuous.



Figure 1. Red imported fire ant (IFA) workers swarming a boot.



Figure 2. A red IFA worker.



Figure 3. Pustules on arm resulting from IFA stings.

INTRODUCTION

Imported fire ants (Order Hymenoptera, Family Formicidae) (IFA) (Figs. 1 and 2) are social insects representing two South American ant species: the red imported fire ant (*Solenopsis invicta* Buren) and black imported fire ant (*Solenopsis richteri* Forel), along with their hybrid offspring. IFA are native to South America, where their colonies are kept in check by native competitors, predators, and parasites. However, they have invaded other countries, including Australia, New Zealand, and the U.S., where they have caused agricultural, ecological, economical, nuisance, and public health problems (Fig. 3), which are described in more detail below (see ‘Impacts’ section). IFA were first detected in the U.S. in Mobile, Alabama, likely arriving in soil used as ship ballast in 1918 (black

IFA) and the late 1930s (red IFA). Although IFA can spread naturally by flying short distances, long-distance spread is caused primarily by the movement of infested materials, such as baled hay and straw, nursery stock, potting media, grass sod, soil, honeybee hives, and trains, vehicles, and equipment. IFA is a quarantine pest, and its presence can restrict movement of regulated articles.

IFA currently occur in Alabama, Arkansas, California, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and the commonwealth of Puerto Rico. Isolated infestations have been reported in Arizona, Kentucky, Maryland, Oregon, and Washington. The red imported fire ant has a wider distribution than the black imported fire ant, which has only been reported from Mississippi, Alabama, and Tennessee (USDA 2019). In colder regions, IFA may be able to temporarily establish during unusually warm years, or in settings where a heat source exists, such as climate-controlled buildings and greenhouses (Global Invasive Species

Database 2019). IFA are NOT known to occur in Utah, but parts of Washington, Iron, and Kane Counties may be suitable for colony establishment, particularly in areas that have accessible water from irrigation or natural sources (Korzukhin et al. 2001, Sutherst and Maywald 2005). If you suspect IFA in Utah, contact the [Utah Plant Pest Diagnostic Lab](#).

DESCRIPTION

Although IFA can be identified by its physical characteristics, the quickest way is by observing the colony's immediate and aggressive behavior when the nest is disturbed. IFA will swarm from the mound by the hundreds and sprint up surfaces, clamping onto victims with powerful jaws and stinging repeatedly. This reaction is almost instantaneous in temperatures of 55-95 °F (USDA 2019).

All IFA adults have 2 rounded nodes on their petiole (thin "waist" part of the abdomen), and each antenna has 10-segments, the last two resembling a club (Fig. 4).

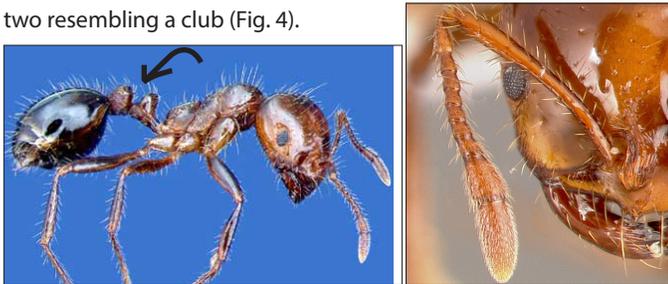


Figure 4. An adult IFA worker showing the "waist" (petiole) with 2 nodes (left image, see arrow); an IFA antenna with 10 segments that end in a 2-segmented club-like tip (right image).

Reproductives

Queens are about 3/8 inch (1 cm) in length and have wings until just after mating (Fig. 5). Their antennae have an elbow-like bend, and their abdomen is elongated. Red IFA queens are light reddish brown in color, while black IFA queens are dark brown to black with an orange-yellow spot on the back of the abdomen (gaster). Hybrid queens look like either of the parent species or a combination of the two. Male reproductives of both species are winged and dark in color with much smaller heads and non-elbowed antennae (Fig. 5).



Figure 5. An unmated red IFA queen with workers (left image); a red IFA male depicting the typical wings, smaller head, dark coloration, and non-elbowed antennae (right image).

Workers

Worker size varies within the colony, ranging from 1/16 inch to 1/4 inch (1.5 to 6 mm) in length (Fig. 6). The abdomen is short

and round with a stinger at its tip. Coloration is similar to their respective queen.

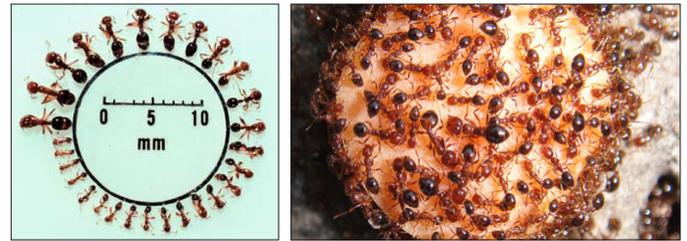


Figure 6. Both red and black IFA workers vary in size within a colony (left image); red IFA workers of various sizes on a slice of hot dog (right image).

Workers are the most commonly observed life stage and, as many ants look similar to IFA, microscopic examination by a trained entomologist is needed to confirm the identity of suspected IFA. Aggressive ants in Utah that may be confused with IFA are harvester ants (*Pogonomyrmex* spp., commonly called "red ants") and thatching ants (*Formica* spp., commonly called "field ants"), but these native ants build mounds or flattened areas that are covered with small gravel (harvester ants) (Fig. 7) or thatch (thatching ants) with an above-ground entrance, and unlike IFA, their workers commonly use above-ground trails. Thatching ants can bite, and harvester ants can both bite and sting.



Figure 7. Harvester ants and thatching ants commonly occur in Utah and may be confused with IFA. Top row: western harvester ant (*P. occidentalis*) workers at their mound entrance (upper left image) and a typical western harvester ant mound (upper right image); Bottom row: western thatching ant (*F. obscuripes*) workers (lower left image) and their thatch-covered nest (lower right image).

Brood

Brood (Immature Life Stages) includes eggs, larvae, and pupae (Fig. 8). Eggs are tiny, oblong, and white to cream in color. Larvae are legless, cream-colored, and kidney-shaped with Velcro-like recurved hairs. Pupae resemble pale, shiny white adults and darken as they mature.



Figure 8. Red IFA queen on brood (left image); IFA pupa (right image).

NEST

The IFA nest (Figs. 9 and 10) is typically a dome-shaped mound of excavated soil that has no visible entrance, as the ants enter and exit through underground tunnels. The mound may be 12 inches or more in height, 10 inches or more wide, and three feet or more in depth. However, mound dimensions vary with age, soil type, and moisture level. Mounds built in clay soils are often larger than those in sandy soils, whereas mounds built in turfgrass are typically only a few inches tall due to mowing that removes the raised part of the mound. New nests are small and easily undetected. Undisturbed nests can reach over three feet in height and width (Lofgren et al. 1975), and mature colonies can have 200,000 ants (Tschinkel 2006).

Mounds are often located in open, sunny areas, against structures, along field edges, at the base of trees or bushes, along fence rows, under sidewalks, and in disturbed areas such as cleared pastures, parks, pipelines, powerline rights of way, open areas near streams, and near new roads and construction sites. Occasionally IFA will nest in structures such as tree trunks, rotten logs, walls of buildings, and in outdoor electric and water utility housings (UCANR 2013, USDA 2019). Take care to not confuse mounds made by pocket gophers (*Thomomys* spp.) (Fig. 11) with mounds made by IFA. Pocket gopher mounds typically are fan-like in shape and have a central hole that is filled with a soil plug.



Figure 9. IFA mounds (left to right) along a road, in a pasture, and around a sprinkler head.



Figure 10. IFA mound built at the base of a tree.

Figure 11. Pocket gopher mounds are potential IFA lookalikes that commonly occur in Utah.

IMPACTS

IFA can cause agricultural, ecological and economical impacts. They primarily feed on living insects and other invertebrates (Fig. 12), but can also feed on dead animals, animal products (such as

insect honeydew), and seeds, seedlings, and developing fruit and tubers of numerous crops, including field crops (corn, sorghum, potato) and tree fruit. They can disrupt lawn and farm machinery, girdle young trees, disrupt root growth, reduce moisture-holding capacity, displace native ant species, and reduce wildlife in some areas. They form unsightly dirt mounds, interfere with mowing, and invade lawns, gardens, flower beds, compost piles, fallow fields, and even electrical equipment and utility housings.

IFA are considered nuisance pests and can pose serious threats to public health. IFA stings can result in injury or death of livestock, wildlife, domestic animals and, in rare instances, humans. The venom injected from the sting can produce a prolonged “fire-like” burning and itching sensation that lasts for up to 3 days. Some people may develop a sterile blister and/or itchy whitish pustule (Fig. 13) at the sting site. Secondary infections and permanent scarring can occur when the pustules are scratched or broken (Fig 13). In hypersensitive individuals, reactions may include seizures and anaphylaxis. Because a small percentage of humans develop allergies to IFA stings, seek medical attention if you experience chest pains, nausea, rashes, dizziness, paralysis, or shock after being stung (UCANR 2013, Potiwat and Sitharungsi 2015, USDA 2019).



Figure 12. IFA feeding on (clockwise from left to right) an insect larva, tri-colored heron chick, and grasshopper.



Figure 13. Pustules resulting from IFA stings (left image); secondary infection on a hand as a result of an IFA sting (right image).

LIFE HISTORY

IFA have four main life stages: egg, larva, pupa, and adult. The IFA life cycle begins with the nuptial flight, when the male and female “reproductives” leave the nest to find a mate. Males die soon after mating, and each mated female immediately begins searching for a suitable nesting site, after which she removes her wings and enters or digs underground chambers where she lays and cares for her eggs and developing progeny. Eggs hatch into larvae in 8-10 days,

and the larvae undergo 4 molts (instars) over 3-5 weeks, and only during the final larval stage can solid food be ingested. The larvae will molt into pupae and emerge as adults 3 to 5 weeks later. The queen will continue to lay eggs until her death, and both she and the eggs will be cared for by workers.

In the southeastern U.S., IFA mating flights typically occur between April and July, but can continue into the fall, depending on environmental conditions. The flights are triggered by rain, especially following a prolonged dry spell and when the temperature is between 70-95 °F, relative humidity is 60-80% or higher, and wind is minimal (Tschinkel 2006). In California, the reproductives are produced throughout the year (UCANR 2013).

IFA colonies can have one queen (monogyne) or more (polygyne) per nest; in polygyne colonies, there can be up to 80 queens, and each queen shares in egg laying and colony leadership. A mature queen can lay from 200 to about 3,000 eggs per day. Queens can live for more than 7 years, and active nests can persist indefinitely by replacing the queen. The queen lays both fertilized and unfertilized eggs. Fertilized eggs become female ants, most of which develop into sterile workers but some will become future queens; unfertilized eggs become male reproductives.

MANAGEMENT

As IFA has NOT been detected in Utah, there is no current need for control of this insect. The management options listed here are provided should this pest be detected in Utah in the future. If you suspect IFA in Utah, contact the [Utah Plant Pest Diagnostic Lab](#) prior to conducting your own control program.

All control options must start with proper identification of the pest ant; it is very likely that the ants you are observing in your area are not IFA. Unfortunately, fire ants can be difficult to control and eliminate because the highly guarded queen must be killed in order to eliminate the colony; in polygyne colonies, all of the queens must be killed. A queen can relocate her colony when her nest is disturbed, and in a polygyne nest, “budding” can occur, where some of the queens and workers will leave and form a new colony nearby. Control methods targeting the worker caste are only temporarily effective, as the queen can rebuild the colony in a few weeks, and strategies that rely on treating every mound are also largely ineffective as the newer colonies can be inconspicuous and easily overlooked. Further, successfully treated nests can quickly be re-infested by colonies or queens migrating from other areas. In Australia, trained odor-detection dogs are being used to identify IFA in suspected areas (Wylie et al. 2016).

Cultural Control

If you suspect IFA, avoid frequent nest disturbances, as this has

been shown to cause IFA to migrate to nearby undisturbed areas (Drees et al. 2013). Pouring 3 or more gallons of scalding water on mounds, however, has been shown to eliminate 20-60% of the nests treated (Drees et al. 2008, Univ. of Florida Ext 2018). Applying popularized home remedies such as instant grits, molasses, aspartame, or club soda to the nests do not work. Further, pouring fuel, chlorine, or ammonia on nests is not recommended as these are dangerous and can contaminate the soil and groundwater (Drees et al. 2008).

Biological Control

The best biological control program for controlling IFA includes preserving native ant competitors and native enemies, including invertebrates (e.g., praying mantids, robber flies, dragonflies, ground beetles, spiders) and vertebrates (e.g., lizards, birds). Phorid flies of the genus *Pseudacteon*, also called decapitating flies, are being used as part of a biocontrol program in an effort to manage IFA in infested areas of the U.S. *Pseudacteon* are highly specialized to attack and consume ants (Porter and Plowes 2018); however, they are not available to the general public. Other biological control agents include viruses (e.g., SINV-1, -2 and -3) (Valles 2012, Valles et al. 2014) and parasitic fungi (e.g., *Beauveria bassiana* strain NI8) (Rojas et al. 2018). Biocontrol agents available for purchase, such as parasitic nematodes, are ineffective on IFA (Dunn 2019).

Chemical Control

Spraying repellent insecticides on a nest or on the foraging fire ants should be avoided, as it may result in the colony dispersing to another site and may make control more difficult. Fire ant baits, however, are recommended for control of IFA as they are effective, providing control for 6 to 18 months, and are inexpensive and safe for the environment when label directions are followed. Most baits consist of registered insecticides on corn grits coated with soybean oil. Active ingredients in products labeled for this purpose include abamectin, bifenthrin, fipronil, hydramethylnon, indoxacarb, metaflumizone, methoprene, methoprene plus hydramethylnon, pyriproxyfen, and spinosad. Foraging ants (the workers who gather food for the colony) carry the bait back to the nest to share with the queen. Place baits directly into active crevices, near nests, or broadcast over whole areas when ants are foraging. To check for foraging activity, place a piece of greasy food near the nest, and check it in 30 to 60 minutes. Note that bait effectiveness decreases with water contact, sunlight, and extreme heat; therefore, broadcast in the evening for best results in hot conditions, and avoid applying to wet ground or when rain is expected. In more heavily infested areas, using a two-step method that combines baiting with an application of liquids, dust, or granulars is a preferred method of control (Drees 2014).

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