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ENTOMOLOGY

Red Imported Fire Ants Continue to Spread North and West

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Solenopsis invicta (Buren), the red imported fire ant, was accidentally brought into Mobile, AL in the ballast of ships from South America in the 1930s. Since its introduction, this species has spread throughout the southeastern United States and now continues to expand its northward and westward distribution into areas with mild climates and adequate moisture and food. The ants currently infest over 240 million acres and can be found throughout Puerto Rico, Florida, Georgia, Alabama, Mississippi and Louisiana and in portions of South Carolina, North Carolina, Tennessee, Arkansas, Oklahoma and Texas. In addition, infestations of the red imported fire ant were recently found in Fresno, Kern, and Orange Counties in California.

Fire ants disperse naturally through mating flights, through colony relocation over short distances or by floating to new locations in floodwater. Humans also assist in the distribution or movement into new locations through shipments of ant infested nursery stock, sod, soil, hay, pine straw or beehives. Despite quarantine efforts aimed at preventing the movement of fire ants, it is not uncommon to find that imported fire ants "jump ahead" of the natural distribution due to movement of infested products.

Large mound of the imported red fire ants.

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Friend or foe?

In some settings the red imported fire ant is considered a beneficial insect. The ants feed on just about anything, but their preferred source of food is other insects. In some agricultural settings they prey on very destructive insects. They also reduce the populations of many human and animal pests, such as ticks, fleas and flies.

Although fire ants can be considered to be beneficial insects in some settings, when looking at the "big picture," one must consider the numerous problems they create. Once fire ant mounds are exposed to environmental conditions, the above-ground portion of their mounds becomes very hardened and causes significant damage to turf and farm equipment. Damage to equipment results in lost time in labor as well as equipment repair costs. Adult ants often move into electrical housing units and chew away insulation from wiring. Fire ants cause numerous power outages or electrical shortages in air conditioners, irrigation control boxes, traffic lights and water pumps. In areas where heavy infestations occur (200-plus mounds per acre), fire ants have significant effects on populations of ground nesting birds, deer and other wildlife. Imported fire ants will also feed on seeds and young roots, causing significant plant loss in some agricultural cropping systems.

Although fire ants damage equipment, cause electrical problems and harm wildlife, the most significant problem associated with fire ants is their stinging behavior. The ants are very aggressive and will readily attack anything that disturbs their mound.

When a mound is disturbed, large numbers of worker ants come to the mound surface to defend the colony. An unsuspecting victim can be rapidly covered with ants. The ants anchor themselves with their mouthparts and then sting repeatedly. Venom injected through their sting causes a burning and itching sensation and often causes a white pustule to form. Although fire ant stings are not usually life threatening and are medically uncomplicated, a few people are hypersensitive to the venom and may suffer chest pains, nausea or lapse into a coma from even one sting.

Look Inside an Ant Mound

Fire ant colonies consist of the brood (eggs, larvae and pupae) and adult ants. The various types (castes) of adult ants include winged males, winged females, one or more egg producing queens and workers. Within a colony, the worker ants vary a great deal in size, but they are all sterile, wingless females. Workers care for the queen and the brood, forage for food and defend the colony.

Winged adults and queens are responsible for dispersal and reproduction. The winged "reproductives" eventually leave the mound in large numbers to mate in the air. This mating or nuptial flight can take place any time of year, but usually occurs in the spring or early summer after a rainy period. Males die shortly after mating. The newly fertilized queen can fly for several miles before she falls to the ground, sheds her wings and begins digging a chamber in which to start a new colony.

The new queen lays a small cluster of eggs that hatch in seven to ten days. The queen initially provides nourishment to this first group of larvae, but later on, she lays up to 200 eggs per day and the care of the eggs and larvae is taken over by worker ants. The larvae develop for six to ten days before pupating. Adults emerge from the pupae in nine to 15 days. The average fire ant colony contains 100,000 to 500,000 workers and up to several hundred winged forms. Mounds may contain only one egg-laying queen (monogyne colony) or have multiple queens (polygyne colonies). Single queen colonies will not accept workers from other colonies and are defensive of their foraging territory. Populations of single queen colonies usually stabilize at 40 to 80 mounds per acre. Multiple queen colonies are more accepting of workers from other colonies and thus their populations often exceed 200-plus mounds per acre.

The mound of a new colony is not conspicuous until several months after the young queen begins egg laying. The size of

the mound depends upon soil characteristics and land disturbance. In heavy soils the upper portion of the mound is often conical and can reach a height of 12 to 18 inches, while in sandy soils the mounds are less well developed. The underground portion of the mound is a series of tunnels and chambers that may extend three to four feet deep.

Fire Ant Control Strategies

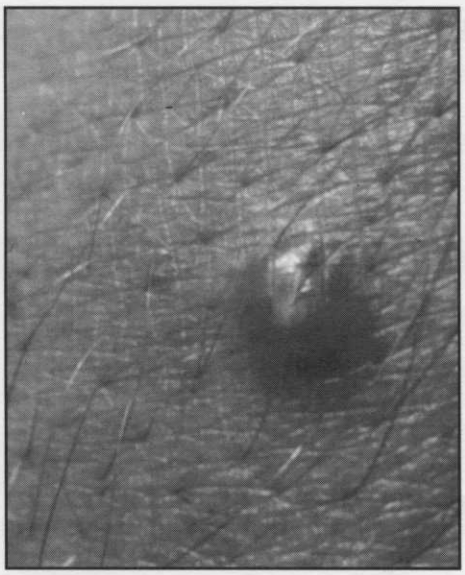
Total elimination of the red imported fire ant in fully infested areas is not technically, environmentally or economically feasible. Temporary control of fire ants can be achieved with the use of chemicals; however they must be periodically reapplied for as long as control is desired. If treatment is terminated, reinfestation is likely to occur as newly mated queens from surrounding areas reinvade the area. Furthermore, it is common for the newly repopulated levels to be larger than the population prior to the initial treatment!

The decision to treat fire ants, once taken, must be accompanied by a long-term commitment to continue periodic treatments. Because of this need for a long term commitment, it may be difficult to economically justify an ongoing control program in many agricultural settings. In high use areas such as parks, playgrounds, recreational turf areas and home lawns, justification for fire ant control programs is more subjective. One must decide when fire ants become intolerable and how much to invest in control efforts. These decisions are influenced by potential health risk due to the presence of fire ants and by the environmental impact of chemical applications.

Treating Individual Mounds

Common methods used to treat individual mounds include drenching each mound with a diluted liquid insecticide; application of granular insecticides to the top of each mound; injection of insecticide into each mound; or application of bait around each mound.

The treatment of individual mounds is a control technique that is best suited for use in small areas where there are low populations of fire ants (less than 20 mounds per acre). Treating each mound requires more labor and monitoring than other treatment techniques and is not suggested for areas where fire ant populations are extremely heavy.



Although fire ant stings are not usually life threatening, a few people are hypersensitive and may suffer chest pains, nausea or lapse into a coma.

Time insecticide applications when the adult ants and their brood are located in the top portion of the mound, usually in the spring or fall or following periods of heavy rain.

To be effective, it is important to time application of these insecticides to when the adult ants and their brood are located in the top portion of the mound. Mound treatment is most effective when applied in the spring or fall of the year or following periods of heavy rain. This technique of treatment selectively controls fire ants but reinvasion of the site by ants is often observed within three to six months.

Mound drenches: Most fire ant control products are formulated as liquid concentrates, although a few are ready-to-use formulations. These concentrated products may need to be diluted in the amount of water specified on the product's label so care should be taken in handling the concentrate to avoid contact. The solution is poured on top of and

around the perimeter of an undisturbed mound. It is important to deliver the diluted insecticide to the mound in quantities large enough to reach the queen and the brood. On larger mounds, up to two gallons of diluted insecticide may be needed. Mound drenches generally do not kill ants immediately and may require several days to be effective.

Granular products: Several products containing insecticides have been formulated as granules to be applied to individual mounds at a specified rate. To treat a single mound, the recommended amount is sprinkled on top of and around the base of the mound without disturbing the mound. If instructed, water the granules into the mound without disturbing the colony. Several days may be required for the entire colony to be controlled.

Dusts: A few products, such as those containing the active ingredient acephate, are specially labeled for dusting individual fire ant mounds. The powder is distributed evenly at the recommended rate over the mound. Treated mounds should be eliminated within one week. Acephate can also be used as a mound drench.

Injectable products: Products containing pyrethrins, tetramethrin or chlorpyrifos are manufactured in special aerosol containers to which an injection rod can be attached. The rod is inserted into the mound in a number of places, according to instructions on the label, and the pesticide is injected for a specified time into each mound. Smaller mounds may require less insecticide. Products containing pyrethrins immediately kill ants in the mound; however, foraging workers outside the mound are not affected. Although these products are more expensive and time consuming to use, they tend to give faster results than mound drenches. Injectable products also have the advantage of depositing the pesticide underground out of reach of people and pets.

Baits: These products contain pesticides formulated on bait of processed corn grits coated with soybean oil. Baits can be applied around individual mounds or broadcast over larger areas at specified rates. As an individual mound treatments, bait products are slower acting and often more expensive than drenches, granular or injectable insecticides, but as an area treatment they offer the advantage of covering larger areas for moderately infected sites (greater than 20 mounds per acre.

Using baits as a broadcast application for infested areas prior to individual mound treatment can be an effective longer term treatment strategy. This approach is best suited for larger areas where fire ant populations exceed twenty mounds per acre and there is little or no concern for preserving native ant species. This combined program of area treatment followed by mound treatment provides long term ant suppression and minimizes the necessity of individual mound treatments.

Application methodology

Contact insecticides: Several control products are labeled for broadcast application. The granular formulations are usually applied with either broadcast or drop-type fertilizer spreaders and the liquid formulations can be applied with high volume hydraulic or individual backpack sprayers. Once applied, these contact control materials should be thoroughly watered into the soil.

Products containing carbaryl, chlorpyrifos, diazinon or isofenphos are longer acting, contact insecticides that primarily suppress foraging ant activity and can prevent small mounds from becoming established. In some cases and through repeated use, these treatments can eliminate colonies.

Bait-formulated insecticides: Bait products contain different active ingredients that work in unique ways.

Hydramethylnon kills ants that ingest it by interfering with the ants' ability to convert food into energy. When applied at the broadcast rate, approximately 80 percent of the mounds in the treated area will become inactive within about five weeks.

The active ingredients fenoxycarb, abamectin, pyriproxyfen or s-methoprene act as "insect growth regulators" when applied at broadcast rates. These products do not kill worker ants or queens; instead, they render most queens incapable of egg production and cause the brood to develop into winged males and sterile females. Reduction of mounds within a treated area is slow, requiring several weeks to many months for the worker ants to die off. However, during this period, the weakened mounds in the treated area apparently prevent recolonization by newly mated queen ants, providing an extended period of suppression which may last up to a year after treatment.

The time required for ants in treated mounds to die depends on the active ingredient used. Hydramethylnon usually eliminates ants in about a week. Avermectin has some toxic effect on worker ants at high dose, but still requires several weeks to achieve control. Ant activity in mounds treated with fenoxycarb, pyriproxyfen or s-methoprene may be seen for five weeks or longer following treatment as worker ants slowly age and die.

Conclusion

Managing imported fire ants requires is a multifaceted strategy.

- Managers must decide if the current location of any mounds requires control efforts.
- Once a control decision is made, managers should quantify the level of infestation at the site.
- Areas of light infestation can be managed with individual mound treatment strategies.
- Moderate infestations can be managed with broadcast treatments.
- Heavier infestations can be managed with a combination of broadcast and mound treatments.
- Extensive site infestations in heavily infested regions of the country usually require some accommodation be made between human and ant activity, in addition to control measures, for satisfactory results to be obtained.

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