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Survey-Based Management of Red Imported Fire Ants

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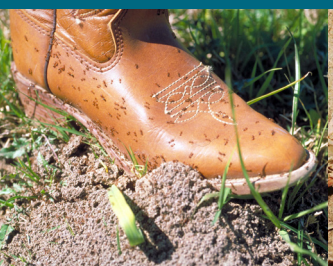
Integrated pest management (IPM) combines compatible biological, chemical, and cultural controls to deal with problems caused by the red imported fire ant, *Solenopsis invicta* Buren (Hymenoptera: Formicidae) in cost-effective and environmentally sound ways. One of the primary components of an IPM program is using an "economic threshold" or "action level" based on the results of insect scouting or population monitoring. This fact sheet discusses how to monitor red imported fire ants and base decisions for their management on the results. Periodically conducting these same methods can also evaluate the effectiveness of any chemical or nonchemical suppression methods.

Currently recognized approaches for managing the red imported fire ant in home lawns and other ornamental turf, as described in the Texas A&M AgriLife Extension Service publication, *Managing Red Imported Fire Ants in Urban Areas*, include the Two-Step Method, individual mound treatments, and the Long-Residual Contact Insecticide Treatment Method. Considerations for choosing the most suitable approach or combination of choices for a given managed area include:

- Population density of fire ant mounds that are present (The Two-Step Method, which uses periodic broadcast applications of a bait-formulated insecticide, is discouraged in areas with fewer than 15 to 20 mounds per acre and where preservation of native ant populations is a concern.)
- Sensitivity to contact insecticides (Consider using the Two-Step Method and individual mound treatments, which require fewer pesticides.)
- Tolerance for low populations of ants (Consider using the Long-Residual Contact Insecticide Treatment Method.)

Monitoring Fire Ant Mounds

Counting the number of active fire ant mounds in your yard or management area is a simple and easy way to document the population of fire ant colonies. This method assumes that each mound





is evidence of a fire ant colony. The results will help determine the most suitable approach for managing ants in the area. For instance, the action level to justify using the Two-Step Method is about five mounds per ¼ acre lawn.

After applying products to the area or to individual mounds, the number of active mounds should decline.

However, this approach has several disadvantages:

- Small, newly developing fire ant colonies may be missed by visually inspecting for ant mounds.
- During hot, dry periods, fire ants dwell deeper in the soil and do not make a tall, observable mound. Also, mounds may already have been treated.
- Some fire ant colonies are located in tree stumps, compost piles, or other structures where their colony may not be readily observed or not associated with a mound.
- Counting mounds does not allow the detection of native ant species, which may not build mounds at all. Native ants compete with fire ants for resources and prey on newly mated fire ant queens that are trying to establish new colonies. Maintaining and encouraging these native species is one of the best defenses against the red imported fire ant (see *Potential Biological Control Agents for the Red Imported Fire Ant*).

In research plots, fire ant mounds are usually counted in subplot areas of a consistent size (e.g., 1/4 acre), and mounds are often rated to describe the number of ants present (1 through 5, with 5 being the most). Presence and type of brood (larvae and pupae) are also recorded. These data provide even more information about subtle changes that can slowly occcur from any applied biological control agents or chemical treatments.

To sample in circular subplots, place a stake in the center; a string, chord, or measuring tape of a known length forms a radius to use to measure the sampled area. For instance, a radius of 17.7 miles will create a 0.1 hectare or 980.1 square mile subplot (58.9 feet will create a 0.25 acre or 10,899 square foot subplot) Detect the active mounds by walking along the radius as you move it around the full circle. Active mounds can either be counted directly or assessed using some type of rating scale that assesses size, ant numbers, and/or the presence of reproductive brood (larvae and pupae) (Banks et al., 1988). The minimal disturbance method counts ant mounds as active when a dozen or more emerge from a suspected ant mound when disturbed with a stick or similar object (Drees and Vinson, 1990). Ant mound ratings require shoveling into a mound to reveal the brood. This is a semi-destructive method, used more commonly in research to assess product performance and insecticide mode of activity. Mound count data are relative measures of fire ant numbers because some colonies are too small to detect or they nest below the surface.

Surveying for Ant Foraging Activity

Worker ants of almost all ant species forage away from the colony for food and water at certain times of the day and year. Some ant species forage only underground. Although most ants eat a wide variety of foods (they are omnivorous), certain species prefer some types of foods and some even change their preferences over time.

Foraging workers of some ant species, such as fire ants, establish temporary chemical (pheromone) trails that allow nest mates to locate food and water resources. These species can “recruit” other ants to a resource quickly and in high numbers. Normally, collected food is brought back to the colony and fed communally among the other members of the colony, including the queen(s) and brood.

Conducting foraging ant surveys may take more labor, time, and expertise than simply counting fire ant mounds. However, results can allow managers to better target appropriate management efforts and to document the impact of suppression actions.

A simple way to survey for fire ant foraging and recruitment is to establish a pattern of "food-lure stations."

Make food-lure stations using an attractant such as moistened hot dog slices, dry cat food, Vienna sausage pieces, tuna fish, potato chips, or other attractive substances. A standard food lure for assessing imported fire ants and other ant species in research plots and landscape management areas is 1/8- to ¼-inch thick hot dog slices. Use prenumbered containers (such as a 2-dram vial, scintillation vial, or Petri dish) to document their location in the field. They can be mapped and capped later to identify and count the ants collected.

Make a map of the area, such as a field, where the ants are to be managed. Also indicate the type of cover (bare ground, drip lines from shade trees, rocks, types of landscape plantings, etc.) as well as the location of structures, slope or grade, soil moisture, soil types, water sources, and land use in adjacent areas. This information is useful in analyzing the impact of these factors on ant surveys and may be useful in global positioning system (GPS) entries for global information system (GIS) analysis.

Place the vials on their sides in a grid pattern (a 30 to 50 foot grid) or transect the line with similar spacing on the field. Place the bait stations out when ants are foraging, usually when temperatures range from 65° to 90°F.

Wait 45 to 60 minutes before capping the containers to collect, identify, and count the ants later. Capped vials can be frozen or filled with alcohol (after the bait is removed) for storage until the sample is analyzed.

Identify and count or estimate the numbers of fire ants and other species attracted to each station to provide an indication of their abundance and location in the field map (see *Texas Pest Identification: An Illustrated Key to Common Pest Ants and Fire Ant Species*).

This method documents the relative abundance of fire ants and results (using slices of Bar-S hot dogs) and correlates to ant mound numbers, with roughly an average of 30 ants per 10 hot dog slices correlated to 20 ant mounds per acre (Calixto et al. 2011).

This technique allows managers to better target control tactics by applying treatments only in areas with red imported fire ants. In areas with native ants, other methods, such as individual fire ant mound treatments, can more selectively eliminate this species while sparing others.

Furthermore, you can repeat this sampling method over time to document the effects of treatment(s) on both fire ants and native ants. However, results are useful only if you use the same method to provide documentation of the relative abundance of species' composition and population. Improved and standardized methods used in Texas and the nation ensure that the information gathered is useful in a larger context.

Acknowledgments

This fact sheet was originally written by B. M. Drees and released as Fire Ant Plan Fact Sheet #007 in May 1998. It was revised in May 2002.

Citations

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- Calixto, A., R. Pereira, B. Drees, S. Porter, A. Gardea, and M. Harris. 2011. "Resource Discovery and Dominance as a Tool for Estimating Relative Densities of the Red Imported Fire Ant, *Solenopsis invicta* Buren." *Journal of Applied Entomology* (in review).
- Drees, B. M., and S. B. Vinson. 1990. "Comparison of the Control on Monogynous and Polygynous Forms of the Red Imported Fire Ant (Hymenoptera: Formicidae) with a Chlorpyrifos Mound Drench." *Journal of Entomological Science*, 25, 317-324.

References

Managing Red Imported Fire Ants in Urban Areas
www.extension.org/pages/11004/managing-imported-fire-ants-in-urban-areas-printable-version

Potential Biological Control Agents for the Red Imported Fire Ant
u.tamu.edu/ento-008

Texas Pest Identification: An Illustrated Key to Common Pest Ants and Fire Ant Species
u.tamu.edu/ento-001

Broadcast Baits for Fire Ant Control
www.agrilifebookstore.org/product-p/e-628

Fire Ant Control: The Two-Step Method and Other Approaches
www.agrilifebookstore.org/product-p/ento-034.htm

For more information regarding fire ant management, see Extension publications *Managing Red Imported Fire Ants in Urban Areas*, *Broadcast Baits for Fire Ant Control*, or *Fire Ant Control: The Two-Step Method and Other Approaches* posted on http://AgriLifeBookstore.org.

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