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How to Plan, Implement, and Evaluate a Spot-Eradication Program for Imported Fire Ants

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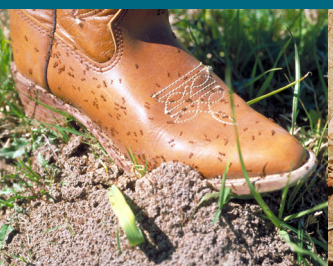
The red imported fire ant, *Solenopsis invicta Buren,* the black imported fire ant, *Solenopsis richteri Forel,* and their hybrids infest much of the southeastern United States and parts of some western states (Arizona, California, and New Mexico). In large infested areas, eradication is not feasible because current treatment methods require treatment of all infested areas. Any untreated infested areas within miles of these treated areas will serve as a source of reinvasion.

To date, there has been no documented case of a successful imported fire ant eradication program, although many isolated spot infestations have been treated. As a result, spot treatment of some counties with limited infestations has prevented them from being added to the list of areas quarantined by the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA, APHIS).

Although there has also been no incident in which a previously quarantined area was removed from the quarantined area list, planning for such an effort would be required. Some newly infested areas that are not connected to, or are isolated from large infested areas, could be prime candidates for attempting a spot-eradication effort to prevent or remove the quarantine status. Examples could include West Texas infestations in Ector and Midland counties (currently under quarantine), El Paso and Lubbock counties, and limited areas of infestation in Arizona, California, and New Mexico.

Treatment Program Considerations

Imported fire ant suppression in large acreage is feasible only when using chemical methods that use broadcast applications of bait-formulated insecticides. When properly applied, these products eliminate about 90 percent of the ant mounds within weeks to months. The effects can last up to a year, depending on the product selected, reinvasion potential due to climactic conditions, and the size of the treated area. As a result, multiple broadcast applications of bait product(s) would be necessary in order to approach 100 percent "control." Only in fairly small isolated infestation areas (less than a few acres) should individual ant mound treatments be considered as a treatment approach. Otherwise, mound treatments should only be used as





part of the Two-Step Method of fire ant control (see *Fire Ant Control: The Two-Step Method and Other Approaches*), which relies on the periodic broadcast application of ant bait products.

Most bait products are not registered for use in all sites where fire ants occur, and none can be applied directly to bodies of water or wetlands. Only one product, Extinguish (containing s-methoprene), is registered for use in both nonagricultural land as well as cropland, including pastures. Most products lack registration for food crop areas. Furthermore, bait products can also have non-target effects, particularly on native ant species that compete with the imported fire ant for food, nesting sites, and resources.

S-methoprene and similar-acting compounds (fenoxycarb and pyriproxyfen) are insect growth regulators (IGR's). These have similar modes of action (how a particular chemical or compound works to kill or disable a pest) and do not kill the adult stages of fire ants. These IGR's prevent queen ants from producing new worker ants for months after treatment. Consequently, colonies decline slowly as the aged worker ants present at the time of treatment die off naturally and are not replaced by new worker ants. Several other bait products (abamectin, fipronil, hydramethylnon, metaflumazone, and spinosad) have modes of action that can kill worker ants and thus give a quicker suppression. Using products with these two modes of action either in combination or sequentially can maximize control efforts.

A conceptual treatment program for a spot-eradication program should include the following considerations:

- Areas considered for an attempted spot eradication should not have other areas of infestation that could serve as a source for reinvasion within 2 to 5 miles or more (a reasonable distance beyond the length of most mating flights—although with prevailing winds extending flights, this distance should be increased).
- ALL infested lands within the area will require treatment.
- Multiple broadcast applications of one or more bait products will be required for several years in any reasonable attempt to achieve 100 percent control.

Base your choice of what type of bait(s) to use and when to apply them on the research results of experiments performed under local conditions. Product evaluation data from other areas with different climate and soil conditions may not apply since fire ant biology may change under different conditions. Most likely, you will need to make broadcast applications two to four times per year, at least in spring and fall, for at least 2 to 3 years as a first attempt at spot eradication.

Some treatment program options include:

- For program initiation, apply an IGR bait first and a faster-acting bait several days or more afterward.
- For program initiation, apply a faster-acting bait first and treat again 6 or more weeks later with an IGR bait.
- Use hopper blend treatments of a 1:1 mixture of an IGR product plus a faster-acting bait.
- Alternate an IGR bait with a faster-acting bait. Applying IGR baits within several months of the last application will not speed up control or improve performance; some faster-acting products have restrictions on the number of annual applications.
- Apply IGR baits twice a year (during drier, stressful parts of the year that increase natural worker ant mortality) with faster-acting products applied during wetter, milder periods that prolong worker ant survival.

Any treatment program you select must use products in strict accordance to instructions provided on the product label or with full support from the manufacturer(s).

Monitoring For Program Success

A commitment to monitor imported fire ant infestations before, during, and after any treatment program implementation is essential for conducting a spot-eradication attempt. Monitoring is labor-intensive and requires an understanding of ant identification, biology, and sampling methodology using reliable, trained personnel. Locate and map all infestation areas and document that surrounding areas are free of the imported fire ant species before initiating the treatment regime. Focus sampling on suspected habitats (golf courses, pastures, riverside areas, etc.) and be aware of movement of ant colonies in floodwater. Monitor for ants two to four times a year and during favorable weather/environmental conditions (temperatures 65° to 95°F and moist soil conditions).

Once treatments have started, periodically monitor ant populations by establishing and maintaining permanent sampling plots to assess ant mound numbers in areas of known size (¼-acre circular plots). In addition to simply counting the number of active ant mounds and determining colony status (the presence of a worker brood if an IGR compound has been applied), use a food lure such as hot dog slices, vegetable-oil-soaked cards, or stations (see *Common Ant Species at Food Lure Baits*) to assess worker ant foraging, especially under drier conditions where the fire ants do not always produce visible mounds or may nest under or in objects such as hardscapes (curbs, rocks, etc.). Select sample sites throughout the treated area, preferably in a grid-like pattern. Monitor native ant species using appropriate methods (see *Survey-Based Management of Red Imported Fire Ants*).

When the treatment regime is completed (2 to 3 years), continue the sampling efforts for an additional 2 years before determining that the treatment program was a success. Sampling methods should remain the same, including sampling adjacent untreated and previously non-infested areas. If you detect ANY imported fire ants, continue or reinitiate the treatment program and extend post-treatment monitoring for 2 to 3 years to detect fire ants in order to claim a successful spot-eradication.

Eradication

Is eradication of imported fire ants from large infested areas in the United States feasible? L. D. Newsom (Louisiana State University) defines eradication as "the destruction of every individual of a species from an area surrounded by barriers sufficiently effective to prevent reinvasion of the area except through the intervention of man."

Mathematics of imported fire ant eradication

First, assume an area 5 miles wide by 5 miles long, (25 square miles) is infested with an average of 40 imported fire ant nests per acre: 25 mi^2 × 640 acres per mi^2 = 16,000 acres infested. Therefore: 16,000 acres x 40 nests/acre = 640,000 nests, total. Then, assume an insecticide treatment that provides 90 percent control with each application (assuming no new colonies are being formed):

Application Number:	Fire Ant Population
0	640,000
1	64,000
2	6,400
3	640
4	64
5	6.4
6	0.64
7	0.06
8	0.006

Economics of imported fire ant eradication

Assume a cost of $6.00 per pound for bait and an application rate of 1.5 pounds of bait per acre. Also, assume a cost of $2.50 per acre for

application cost and aircraft guidance: $6.00 x 1.5 + $2.50 = $11.50 per acre per application.

Based on earlier calculations, 8 applications will be needed to achieve eradication: $11.50 per acre x 8 applications = $92.00 per acre.

Therefore, to attempt to eradicate imported fire ants from the 5 mile x 5 mile area previously described, 16,000 acres x $92.00/acre = $1,472,000, total.

Conclusion

Temporary population suppression is achievable, affordable, practical, and environmentally acceptable. Eradication is not.

Acknowledgments

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References

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

Common Ant Species at Food Lure Baits
www.extension.org/pages/65032/common-ant-species-at-food-lure-baits

Survey-Based Management of Red Imported Fire Ants
u.tamu.edu/ento-007

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

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