



CONSIDERATIONS FOR PLANNING, IMPLEMENTING AND EVALUATING 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 hybrid, infest much of the southeastern United States and parts of some western states (New Mexico, Arizona and California). In large infested areas, eradication is not currently feasible because current treatment methods require all infested areas to be treated. Any untreated infested areas within miles of these treated areas will serve as a source of re-invasion.

To date, there has been no documented case of a successful imported fire ant eradication program, although numerous isolated, spot infestations have been treated. As a result, spot-treatment of some counties with limited infestations have 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 which are disjunct or isolated from large infested areas could be prime candidates for attempting spot-eradication effort to prevent or remove the quarantine status. Examples could include west Texas infestations in Midland and Ector counties (currently under quarantine), El Paso and Lubbock Counties and limited areas of infestation in New Mexico, Arizona and California. This document was developed to present considerations for these areas.

Treatment Program Considerations

Imported fire ant suppression in large acreage is currently only feasible 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 a period of weeks to months, and their effects can last up to a year, depending on product selected, re-invasion potential due to climactic conditions and size of treated area. As a result, multiple broadcast applications of bait product(s) would be required in order to begin to approach 100 percent "control." Only in fairly small isolated areas of infestation (e.g., less than a few acres) should the use of individual ant mound treatments be considered as a treatment approach. Otherwise, mound treatments should only be used as part of a "Two-Step Method" which relies on the periodic broadcast application of ant bait products.

Most bait products are not registered for use in all sites in which 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 non-agricultural 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.

Methoprene and similar-acting compounds (pyriproxyfen, fenoxycarb) are known as "Insect Growth Regulators" (IGR's). These have similar modes of action and do not kill adult stages of fire ants. Treatment with 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 (hydramethylnon, spinosad, abamectin) have modes of action that can result in the mortality of 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 elements:

- Areas considered for an attempted spot-eradication should not have other areas of infestation within 2 to 5 miles or more (e.g., a reasonable distance beyond the length of most mating flights - although with prevailing winds extending flights, this distance should be increased) which could serve as a source for re-invasion.
- 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

What type of bait(s) to select and when to apply them should be based on research results of experiments performed under local conditions. Product evaluation data from other areas with different climatic and soil conditions may not apply since fire ant biology may change under different conditions. Most likely, broadcast applications would need to be applied two to four times per year, at least in spring and fall, for at least two to three years as a first attempt at spot-eradication.

Some treatment program options to select from include:

- For program initiation, applying an IGR bait first and a faster-acting bait several days or more afterward (Note: this has not been tested but is promising, including its variation below)
- For program initiation, applying a faster acting bait first and treating again six or more weeks later with an IGR bait (Note: this has not been tested)
- Hopper blend treatments of a 1:1 mixture of an IGR product plus a faster acting bait
- Alternating an IGR bait with a faster-acting bait (Note: 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)
- Applying IGR baits twice per year (e.g., 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 selected 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

In order to conduct a spot-eradication attempt, a commitment to monitor imported fire ant infestations is necessary before, during and after any treatment program implementation. Monitoring is rather labor-intensive and requires an understanding of ant identification, biology and sampling methodology using reliable, trained personnel. All areas of infestation should be located and mapped; surrounding areas must be documented to be free of the imported fire ant species prior to initiating the treatment regime. Focus sampling on suspected habitats (golf courses, pastures, riverside areas, etc.) and be aware of movement of ant colonies in flood water. Monitoring for ants should be conducted two to four times per year and during favorable weather/environmental conditions (e.g., temperatures 65 to 90 degrees F and moist soil conditions).

Once treatments have been initiated, periodic monitoring of populations will be necessary to document the success of treatments by establishing and maintaining permanent sampling plots where ant mound numbers can be assessed in areas of known size (e.g., 1/4 acre circular plots). In addition to simply counting the number of active ant mounds and determining colony status (e.g., presence of worker brood if an IGR compound has been applied), bait cards or stations to assess worker ant foraging are important, especially under drier conditions where the fire ants do not always produce visible mounds or where they may nest under or in objects, such as hardscapes (curbs, rocks, etc.). Sample sites must be selected throughout the treated area, preferably in a grid-like pattern. Native ant species should be monitored using appropriate methods.

Upon completion of the treatment regime (two to three years), sampling efforts should be continued for an additional two years before determining that the treatment program was a success. Sampling methods should remain the same, including sampling adjacent untreated and previously noninfested areas. The treatment program needs to be continued or reinitiated if ANY imported fire ants are detected, and post-treatment monitoring extended for two to three years to detect fire ants, in order to claim a successful spot-eradication.

Is Eradication of Imported Fire Ants Feasible from Large Infested Areas in the U.S.A.?

Definition of Eradication: "The destruction of every individual of a species from an area surrounded by barriers sufficiently effective to prevent re-invasion of the area except through the intervention of man." — L. D. Newsom, Louisiana State University

Mathematics of Imported Fire Ant Eradication: First, assume an area 5 miles in width by 5 miles in length, (25 square miles) is infested with an average of 40 imported fire ant nests per acre: $25 \text{ mi}^2 \times 640 \text{ acres per mi}^2 = 16,000 \text{ acres infested}$. Therefore: $16,000 \text{ acres} \times 40 \text{ nests/acre} = 640,000 \text{ nests, total}$. Then, assume an insecticide treatment that provides 90% 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 lbs bait per acre. Also, assume a cost of \$2.50 per acre for application cost and aircraft guidance: $\$6.00 \times 1.5 + \$2.50 = \$11.50 \text{ per acre per application}$.

Based on earlier calculations, it has been determined that 8 applications will be needed to achieve eradication: $\$11.50 \text{ per acre} \times 8 \text{ applications} = \92.00 per acre .

Therefore, to attempt to eradicate imported fire ant from the 5 mile x 5 mile area previously described, $16,000 \text{ acres} \times \$92.00/\text{acre} = \$1,472,000, \text{ total}$.

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

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