

Development of Imported Fire Ant Quarantine Treatments for Field-Grown Nursery

PRINCIPAL INVESTIGATOR(S):

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PROJECT OBJECTIVE:

To develop a pyrethroid band treatment protocols to eliminate imported fire ants from nursery stock and satisfy the Federal Imported Fire Ant Quarantine (FIFAQ).

ACCOMPLISHMENTS:

This project has been performed for three consecutive years since 2006. New treatments for eliminating imported fire ants from field-grown nursery stock in Tennessee were first developed by USDA-APHIS personnel at the Soil Inhabiting Pests Section, Gulfport, Mississippi (SIPS), in turf settings. Tennessee trials evaluated promising treatments identified by SIPS under actual nursery settings. The most promising treatments for managing imported fire ants in Mississippi have been a broadcast treatment of a FIFAQ approved fire ant bait (i.e., hydramethylnon, fenoxycarb, pyriproxyfen, or [S]-methoprene) followed 3 to 5 days later with a banded (~ 6 feet [1.8 m] wide band) of a pyrethroid (e.g., bifenthrin, lambda-cyhalothrin, deltamethrin, or permethrin). In Mississippi turf evaluations, one pyrethroid application with fire ant bait completely eliminated fire ants from the treatment site in about 2 weeks and maintained the site fire ant free for about 6 months. In contrast, results in Tennessee nursery sites using either single or double applications of a pyrethroid in combination with fire ant bait have been variable and generally inconsistent. Although we still have not identified an effective treatment for controlling imported fire ants in field-grown nursery stock, we have made several important findings from the project, including:

1. Two pyrethroid band sprays provided greater imported fire ant control than one application. A single application was unacceptable, even at a 2× rate. Clay soils in Tennessee are probably a factor in the lower fire ant control compared to Mississippi.
2. The inclusion of a fire ant bait pre-treatment before the pyrethroid application provided greater imported fire ant control than just using a pyrethroid alone.
3. Pyrethroid treatments that began later (October, November, or December) were more effective than earlier sprays (September). It is likely increased rainfall was responsible for improved late-season fire ant control, possibly by increasing insecticide movement into the soil and by increasing fire ant activity resulting in more insecticide exposure.
4. The width of pyrethroid spray bands, including 5 ft (1.5 m), 6 ft (1.8 m), or 12 ft (3.7 m), did not appear to be a major factor in the level of imported fire ant control.
5. Likewise, total spray volumes of 26 to 87 gallons per acre were not a major factor in the level of imported fire ant control.
6. Floodjet nozzles evaluated during the study performed as effectively as flatfan nozzles. Floodjet nozzles may allow growers to more rapidly treat their nurseries by being able to spray both sides of a nursery row with one pass.
7. Once fire ants were eliminated from nursery sites, pyrethroids like bifenthrin and lambda-cyhalothrin were very effective at preventing re-infestation as indicated by influxes of new fire ant colonies in control plots, but not pyrethroid treated plots.

8. The most effective treatment combination in the study was a bifenthrin treatment followed by a lambda-cyhalothrin treatment, suggesting that alternating pyrethroid types may be more effective than consecutive applications of the same pyrethroid.
9. Imported fire ant colonies that were ranked as large on a scale of 1 to 10 were more difficult to eliminate with pyrethroid + bait treatments than smaller-sized colonies.

TECHNOLOGY TRANSFER / IMPACT:

We have not identified a solution at this time that will consistently and effectively eliminate imported fire ants from field-grown nursery stock using insecticides and rates that will be cost effective to growers and that will comply with existing insecticide label requirements. The main impact of this project to date has been the identification of treatments that are not working and the use of this information to guide future research directions.

New future directions will include: 1) shorter spray intervals between alternating pyrethroid types; 2) tank mixes of different pyrethroid types; 3) directed baiting onto nursery rows to improve imported fire ant elimination within the harvested zone of the nursery row; and 4) targeted treatment of large mounds to control the most difficult to eliminate fire ant colonies.

Our research will have the most grower impact once we identify a consistent and cost-effective treatment that can be recommended for inclusion into the FIFAQ, which will make the results available to all growers in the imported fire ant infested regions of the United States. Our research findings have been transferred by multiple oral and poster presentations, abstracts, and proceedings attended by nursery growers and personnel with university extension, and state and Federal departments of agriculture, including: Southern Nursery Association; Middle Tennessee Nursery Association; Tennessee Green Industry Field Day; Imported Fire Ant Conference; Tennessee General Assembly House Agricultural Committee; International Plant Propagators Society; multiple Tennessee Department of Agriculture Stakeholder Meetings; Congress of the International Union for the Study of Social Insects; Tennessee State University Cooperative Extension Program Annual Ornamental and Turfgrass Pest Management Workshop; University of Kentucky Ornamental Pest Workshop; Tennessee State University Annual University-Wide Research Symposium; 1890's Historical Black Colleges and Universities Association of Research Directors Biennial Meeting; and BWI/Syngenta-sponsored nursery grower workshop on fire ant management. In addition, we have prepared and distributed two extension publications on fire ant management, an update report on fire ant management in the Tennessee Green Times, and served as co-authors on multiple online annual reports by USDA-APHIS (available at the USDA-APHIS website: http://www.aphis.usda.gov/plant_health/plant_pest_info/fireants/gulfport.html).

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- 1) Callcott, A.M. and Oliver, J.B. 2008. Cooperative research funds provided to purchase research plants in Tennessee by USDA-APHIS PPQ Soil Inhabiting Pests Section, Gulfport, Mississippi. 10 Sept. 2008. \$2,016.
- 2) Oliver, J.B. 2008. Development of pre-harvest pyrethroid treatments for imported fire ant management in field-grown nursery stock. Middle Tennessee Nursery Association. 17 June 2008. \$2,500.

- 3) Oliver, J.B., S.A. Ochieng, and M.A. Halcomb. 2007. Bifenthrin band and broadcast treatments to manage imported fire ants in field nursery. Middle Tennessee Nursery Association. 22 October 2007. \$2,500.
- 4) Oliver, J.B., S. Ochieng, M.A. Halcomb, A. Callcott, and K. Vail. 2007. Pyrethroid band treatments to certify field nursery stock against imported fire ant. Horticultural Research Institute. 25 January 2007. \$20,000.

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