

Invasive Management Template with an Initial Emphasis on Thrips

PRINCIPAL INVESTIGATORS:

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PROJECT OBJECTIVES:

Thrips cause serious economic losses in many agricultural systems each year including vegetables and ornamentals. Although there are a number of thrips species attacking greenhouse floriculture crops, western flower thrips (*Frankliniella occidentalis*) is the predominate species causing economic losses. *Scirtothrips dorsalis* is a new invasive species (2005) causing severe economic damage in floriculture and nursery crops. This new invasive species has resulted in a significant challenge to ornamental production systems and threatens established IPM programs for traditional pests. Chilli thrips are now established in Florida (30 counties) and Texas (8 counties) with recent confirmations (2009) in Alabama and Louisiana. Objectives are to determine efficacy and residual activity of registered insecticides against chilli thrips and other invasive insects; develop baseline data on chilli thrips to spinosad and chlorfenapyr for future resistance monitoring efforts; determine direct impact and residual activity of insecticides against key beneficial organisms used for biocontrol of thrips and other invasive pests; and develop model pesticide rotation programs for chilli thrips and western flower thrips.

ACCOMPLISHMENTS:

Predatory Mites Effective Against Chilli Thrips: Two species of phytoseiid mite were evaluated as predators of chilli thrips. In leaf disc assays, gravid females of *Neoseiulus cucumeris* and *Amblyseius swirskii* both fed on the thrips at statistically similar rates. Larvae were the preferred host by both species, consuming on average 2.7/day, compared with 1.1- 1.7 adults/day in no choice tests. Adult thrips were rarely consumed in subsequent choice tests when larvae were also present. Mite fecundity was statistically similar for both species feeding on thrips larvae (\approx 1.3 eggs/day) but significantly less for *A. swirskii* restricted to a diet of adult thrips (0.5 eggs/day). In greenhouse tests with infested pepper plants, both mite species established and reduced thrips numbers significantly over 28 days following a single release (30 mites/plant). However, *A. swirskii* was the more effective predator, consistently maintaining thrips below 1 per terminal leaf, compared with up to 36 for *N. cucumeris* and 70 in control treatments. Similar results were obtained for plants maintained outside in the landscape, where *A. swirskii* continued to reproduce and control thrips up to 63 days post release.

Ornamental Peppers are Ideal Banker Plant Candidates for Predatory Mites in the Landscape: Approximately 400 varieties of ornamental peppers were screened for landscape banker plant suitability. Candidates were chosen for their flowering phenology – varieties should be both attractive to the homeowner and produce flowers continuously to provide adequate amounts of pollen. Experiments were conducted to determine the developmental time (verify the mite's ability to survive), longevity (how long the mites live) and total oviposition (eggs/female) of the predatory mite *Amblyseius swirskii* reared solely on the pollen of 4 varieties of ornamental pepper plants, commercially available olive pollen and a diet of chilli thrips (preferred prey as the positive control). Mites took slightly longer to develop on all sources of pollen ranging from 12.1 - 12.6 days (larvae to 1st egg) compared to 11.8 days for a diet of chilli thrips. Mite longevity was equal among treatments and ranged from 22.8 - 23.7 days. In terms of total

oviposition, the pollen sources were acceptable when compared to the diet of chilli thrips with total oviposition ranging from 8.5 - 9.9 eggs/female for pollen sources and 15.2 eggs/female for chilli thrips. All the ornamental pepper varieties tested will provide a suitable food source for the mite predators when chilli thrips are not present in the landscape.

Pesticide Effect on Predatory Mites: A number of pesticides used to manage chilli thrips have been screened against the predatory mites, *Amblyseius swirskii* and *Neoseiulus californicus*. No significant mortality was observed when the predatory mites were exposed to imidacloprid, dinotefuran or spiromesifen. The only compound that was screened and that has the potential to disrupt the mites is the spirotetramat drench because it is so effective at killing the prey used by these predatory mites. If food is available or coverage is poor most of these treatments would allow for the survival and resurgence of both *N. californicus* and *A. swirskii*.

Pesticide Effect on Chilli Thrips: In collaboration with the University of Florida and Texas A&M, 29 pesticides with 12 different modes of action using three application methods (foliar, drench, or media) were screened against the chilli thrips; management program being developed.

TECHNOLOGY TRANSFER/IMPACT:

Media blitz on chilli thrips control with predatory mites: ARS News Release, entitled “A Biocontrol for a Wide-Ranging Thrips” <http://www.ars.usda.gov/is/pr/2009/090428.htm>, and University of Florida News release, “Predatory mite could put the bite on invasive crop pest, UF researcher says” <http://news.ufl.edu/2009/04/28/thrips/>. Additional news releases highlighting the research published in Biological Control (2009) 49: 91-96 include: <http://www.sciencedaily.com/releases/2009/05/090502083628.htm>; and <http://tampabay.bizjournals.com/tampabay/stories/2009/04/27/daily34.html>. Examples of media releases informing the public about chilli thrips and potential damage to plants that cited either University of Florida or Texas A&M University Web sites (too many to list them all) : <http://www.growermagazine.com/Home/IndustryNewsLanding/tabid/73/Default.aspx?tid=2&cid=832671>; http://presszoom.com/story_149576.html; <http://www.chron.com/disp/story.mpl/gardening/6064160.html>.

Online chilli thrips training module was developed (<http://cbc.at.ufl.edu/>) and a rough draft is available for review thru the National Plant Diagnostic Network.

Two Web sites (<http://mrec.ifas.ufl.edu/iso/thripslinks.htm> and Chillithrips.tamu.edu) created for disseminating chilli thrips information. The University of Florida Web site has had 34,047 page loads since its inception in 2006 with 68 percent (or 11,507 a year) of those occurring during the past 2 years. Texas A&M University Web site was equally active (10,279 page loads a year).

COLLABORATORS:

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