CHILLI THRIPS

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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. Chilli thrips (*Scirtothrips dorsalis*) is a new invasive species causing severe economic damage in floriculture and nursery crops and landscape plants. This new invasive species has resulted in a significant challenge to ornamental production systems and threatens established IPM programs for traditional pests.

Even though western flower thrips have been a pest for over 15 years in most of the United States, floriculture producers are still relying on pesticides as their primary means of management. There are currently only two insecticides, Conserve (Spinosad, Dow AgroSciences LLC) and Pylon (Chlorfenapyr, OHP, Inc.) that have proven to give consistent levels of western flower thrips control. Unfortunately, growers often apply these products as frequently as once a week. This frequent application of two pesticides increases the potential for developing pesticide resistant or tolerant strains. Pesticide tolerance has recently been documented in floriculture crops (Loughner et al, 2005, Ludwig, personal observation). When battling thrips, growers must also contend with phytotoxicity, labor costs associated with frequent pesticide applications, reentry periods into treated areas, arrival of new pests, and the occasional loss of an effective pesticide due to health hazards. Biological control of thrips has been proposed as a solution to these problems (Heinz et al. 2004), but has not been widely adopted by floriculture producers. Biological control is a viable alternative to chemicals in several perennial crops, strawberries, vegetable and ornamental crops grown in greenhouses.

Chilli thrips were first detected in Highlands County, Florida, in 1991. Sampling indicated chilli thrips had not established a population. Subsequently, chilli thrips were detected on roses from Palm Beach County, Florida in 2005. As of November 2007, chilli thrips have been detected in Florida from Duval County (on the northern border with Georgia) to Monroe County (the Florida Keys), Georgia and in Texas. In the Western Hemisphere, chilli thrips have also been detected in Hawaii and the following locations in the Caribbean: Barbados, Jamaica, St. Lucia, St. Vincent, Tobago and Trinidad.

Chilli thrips is a polyphagous species and has been documented to attack more than 100 recorded hosts from about 40 different families. As this pest expands its geographical range additional plants are added to its host range. Among

ornamentals, host plants include roses, chrysanthemums, Gerber daisy, geraniums, dahlia, viburnum, zinnia, Mexican heather, petunia, poinsettia, coleus and verbena. Some trees and shrubs also shelter these pests, including crape myrtles, camelia, Japanese holly, maple, ligustrum, eunomymus, rubber trees (*Ficus elastica*), *Schefllera arboricola, Breynia nivosa* (Snow Bush or Snow-on-the-Mountain), *Duranta erecta (*golden dewdrop, pigeonberry, skyflower), *Hedera helix* (English ivy), and pittosporum (see http://mrec.ifas.ufl.edu/lso/thripslinks.htm for updated host lists).

The life cycle for chilli thrips is similar to that of western flower thrips. Female chilli thrips insert their eggs inside plant tissue. The eggs hatch in 6–8 days. They pass through two larval stages (1st and 2nd instars) that last for 6–7 days. During this time they actively feed on the host plant. They then pass through a prepupal (~24 h) and pupal stages (2–3 days) during which time they do not feed. They can complete their life cycle in 14–20 days. The thrips female oviposit 60 to 200 eggs in her lifetime.

Chilli thrips is mainly a foliage feeder and unlike western flower thrips does not feed on flower pollen. Young leaves, buds and fruits are preferred, but all above ground parts of its host plants may be attacked. Feeding damage turns tender leaves, buds, and fruits bronze in color. Damaged leaves curl upward and appear distorted. Infested plants become stunted or dwarfed, and leaves with petioles detach from the stem, causing defoliation in some plants. Feeding on buds may cause them to become brittle and drop. Chilli thrips have been reported to potentially vector a number of important plant viruses. These include peanut necrosis virus (PBNV), peanut chlorotic fan virus (PCFV), and tobacco streak virus (TSV). According to analyses by the USDA-APHIS-PPQ during 2004, $3 billion dollars in losses would result if only 5% of crop loss occurred for 28 susceptible, at-risk hosts (Spears, B.M. NPAG, USDA-APHIS-PPQ-CPHST, March 3, 2006 report; Garrett 2004). Also, the potential for pesticide resistant populations is possible and producers, extension specialists, and industry need to closely collaborate to promote effective management strategies in order to protect current chemical control options available for thrips management. This is especially critical because of new detections of highly resistant western flower thrips populations in Florida to spinosad (Funderburk personal communication). Spinosad is the foundation for managing thrips in most crops. Overuse of this compound to manage chilli thrips could increase the level and frequency of resistance in western flower thrips populations and result in losing this material as a tool in all commodities. The manufacturer of this compound has voiced a concern about the overuse of this pesticide by the ornamental industry and has considered limiting its use to preserve continued sales in more lucrative markets. They have a new compound for thrips that they don't plan on registering for use in ornamentals. The loss of this compound due to resistance would be a disaster for our industry.

The National Chilli Thrips Alert states “Not enough is known about this pest to provide control recommendations. New data suggests that this pest can be managed with a number of pesticides. Foliar applications of various neonicotinoids (not drenches), abamectin, acephate, chlorfenapyr, flonicamid, and spinosad (Table 1) have provided adequate levels of control in various studies.

There is a critical need for developing resistance management programs for all floriculture pests in general and for thrips and whiteflies in particular. There is also a critical need for integrating biological control agents with existing cultural and chemical controls. Several forces create this need, but it appears that the major one is to preserve the current chemicals that are safe, effective and registered. These chemicals have to be considered a valuable resource and managed appropriately.

Any program designed to change pesticide use patterns in the ornamental plant industry should focus on thrips, mites and whitefly control as major target areas. Reduction of pesticide usage, proper rotation and scheduling of applications, incorporation of biorational materials and a knowledge of which materials can be safely integrated with biological control agents is critical for a number of reasons. First, this information will allow for efficient and effective pest management. Secondly, it will allow floriculture producers to properly steward the valued pesticide resources they desperately depend on. A final benefit from this research will be seen in the programs developed for managing other pests. No IPM program will ever be fully implemented for thrips if growers rely on their current management programs for aphids, mites and whiteflies. The pesticides being used for mites, thrips and whitefly control could have a significant and negative impact on all natural enemies of pest insects and mites (*Orius* species, *Iphiseius degenerans*, *Neoseiulus cucumeris, Amblyseius swirskii*). As a result of the many problems and economic consequences associated with chemical control of whiteflies and thrips, research and implementation of control programs on ornamentals has been underway for many years but implementation of resistance management programs based on sound IPM principles and research is more critical today than ever before.

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Table 1. The following insecticides have been tested at least once in Florida or Texas and **appear to be effective at significantly reducing chilli thrips populations.**

Active Ingredient	Examples (not all inclusive)	Chemical Class
abamectin	Avid 0.15% EC	Glycoside
acephate	Acephate Pro 75 or WSP , Orthene Turf, Tree & Ornamental Spray or 97	Organophosphate
acetamiprid	TriStar	Neonicotinoid
chlorfenapyr	Pylon	Pyrrole
cyfluthrin + imidacloprid	Discus	Pyrethroid + Neonicotinoid
dinotefuran	Safari	Neonicotinoid
flonicamid	Aria	Pyridine carboxamide
imidacloprid	Marathon II , 1% G , 60 WP	Neonicotinoid
thiamethoxam	Flagship	Neonicotinoid
spinosad	Conserve SC	Spinosyn

Note: Mention of a commercial or proprietary product or chemical does not constitute a recommendation or warranty of the product by the authors, the University of Florida, or Texas AgriLife Extension Service. Products should be used according to label instructions and safety equipment required on the label and by federal or state law should be employed. Users should avoid the use of chemicals under conditions that could lead to ground water contamination. Pesticide registrations may change so it is the responsibility of the user to ascertain if a pesticide is registered by the appropriate local, state and federal agencies for an intended use.