



Ornamental Horticulture Program Research Project Sheet

<http://ir4.rutgers.edu/Ornamental/ornamentalProjectInformationSheets.cfm>

Project Name: Thrips Efficacy

New	Ongoing	X	Completed	Duration if ongoing or completed:	2006 - 2017
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Project Description:

Thrips species can be highly destructive from their own feeding on delicate plant parts and the viruses they vector. Western flower thrips (WFT) can be difficult to manage because it tends to feed on flower petals and often hides deep within flower heads, masked by the petals. Good coverage is key to optimal management as is a good rotational program among different IRAC mode of action classes to reduce resistance development. This project arose from the concern of limited tools (Mesurol, Conserve) with known resistant WFT populations as a way to identify new tools to enable growers to effectively manage these pests.

Research Project Abstract (if available):

Abstract from 2015 Thrips Efficacy Summary

For the last 9 years, the IR-4 Ornamental Horticulture Workshop has ranked developing efficacy data on new products to manage thrips as a High Priority Project. Thrips remain an important threat for several reasons: 1) the damage thrips cause to ornamental horticulture plants, decreasing the value of the infested crops; 2) the tospoviruses (tomato spotted wilt, impatiens necrotic ringspot) they can vector; 3) the newly arrived invasive species which impact at least 250 different ornamental horticulture species; and 4) growers lack the ability to rotate among 3 to 4 different modes of actions to effectively manage resistance development in the thrips populations they must control to maintain economic viability. From 2005 through 2015, 81 products representing 53 different active ingredients were tested for thrips management. These products represented both biological and chemical tools. Some products were already registered but more data were needed particularly with the newly invasive thrips species or they were considered standards to measure the level of efficacy achieved with other materials. Other products were in development but have not yet been registered with the EPA. The five thrips species tested in the IR-4 program were Chilli Thrips (*Scirtothrips dorsalis*), Gladiolus Thrips (*Thrips simplex*), Privet Thrips (*Dendothrips ornatus*), Weeping Fig Thrips (*Gynaikothrips uzeli*), and Western Flower Thrips (*Frankliniella occidentalis*).

Target Species (Phytotoxicity, or common and Latin name of arthropod, pathogen, weed):

- Chilli Thrips (*Scirtothrips dorsalis*)
- Cuban Laurel Thrips (*Gynaikothrips ficorum*)
- Gladiolus Thrips (*Thrips simplex*)
- Orchid Thrips (*Chaetanaphothrips orchidii*)
- Privet Thrips (*Dendothrips ornatus*)
- Weeping Fig Thrips (*Gynaikothrips uzeli*)
- Western Flower Thrips (*Frankliniella occidentalis*)

Target Crops (list tested crops if ongoing or completed project)

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|---|---|
| <ul style="list-style-type: none"> African Marigold (<i>Tagetes erecta</i>) Butterfly Bush (<i>Buddleia davidii</i>) Cosmos (<i>Cosmos sp.</i>) Flamingo-lily (<i>Anthurium andraeanum</i>) Geranium (<i>Pelargonium sp.</i>) Gladiolus (<i>Gladiolus sp.</i>) Hardy mum (<i>Chrysanthemum x morifolium</i>) Marigold (<i>Tagetes sp.</i>) New Guinea Impatiens (<i>Impatiens hawkeri</i>) | <ul style="list-style-type: none"> New Mexican Privet (<i>Forestiera neomexicana</i>) Petunia (<i>Petunia sp.</i>) Purslane (<i>Portulaca sp.</i>) Rose (<i>Rosa sp.</i>) Transvaal Daisy (<i>Gerbera sp.</i>) Vervain (<i>Verbena sp.</i>) Weeping Fig (<i>Ficus benjamina</i>) Zinnia (<i>Zinnia sp.</i>) |
|---|---|

Target Product(s)(list tested products or numbered compounds if ongoing or completed project)				
A16901B	Carzol	Grandevo	Orthene TTO	Scimitar CS
Acelepryn	Celero 16WSG	Hachi-HachiKontos	Overture 35WP	Sevin SL
Allectus SC	Conserve SC	Mainspring	Pedestal	Surround WP
Aloft SC	Cyclaniliprole	Marathon 1G	Proud 3	Talstar NF
Aria 50SG	Diazinon 50W	Marathon II	Pylon	Tempo Ultra
Avid 0.15EC	Dimethoate 4EC	Marathon Ultra	QRD 400	TickEx EC
AzaGuard	Discus	Mesurool 75W	QRD 416	TriCon (BW420)
BAS 320i	DPX-HGW86	Met52	S1812 35WP	TriStar 30SG
BotaniGard 22WP	Dursban 50W	MilStop	Safari 20SG	Venerate
BotaniGard ES	EcoTrol	MOI201	Safari 2G	XXpire
Capsil	Flagship 25WG	OHP 929-2	SaferSoap	

Product Registration and Research Status			
	Fully Screened (also includes standards)	Partially Screened through IR-4 ¹	Need Data for AdditionalSpecies?
Labeled for Thrips Generally & Commercialized	Conserve SC * Flagship 25WG Marathon II Marathon Ultra Orthene TTO * Pedestal	Pylon * Safari 20SG * Scimitar CS Talstar NF Tempo Ultra TriStar 30SG	Allectus SC ² Aloft SC ² Discus EcoTrol Marathon 1G Met52 Safari 2G SaferSoap Surround WP
Labeled for Thrips Generally But NOT Commercialized			
Labeled for Specific Thrips & Commercialized		BotaniGard 22WP BotaniGard ES	
Labeled for Specific Thrips but NOT Commercialized		NNI-0101	
Not yet registered or labeled for thrips		A16901B Venerate (MBI 206 F)	MilStop OHP 929-2
No longer available for development for thrips	Carzol Diazinon 50W Dimethoate 4EC DPX-HGW86 Dursban 50W Mesurool 75W	MOI 201 QRD 400 QRD 416 Sevin SL TriCon (BW420)	Acelepryn * BAS 320i Celero 16WSG ² Kontos * S1812 35WP

* IR-4 Data contributed to registration decision – either adding pest to label or not pursuing further research

1 At least one species screened fully

2 Product not available for production ornamentals

Other:

This project also tested tank mix and rotations to foster IPM strategies for managing resistance. Two other projects were offshoots from this one: Thrips Materials Crop Safety and Screening of Impacts on Thrips Beneficial Organisms

Area	Characteristic	Pro	Con
Availability & effectiveness of alternative management tools	Thrips remain a hard to manage pest	X	
	Several IRAC classes are available for resistance management		X
	Very few materials for outdoor uses on WFT	X	
	Very few new tools and new classes for screening		X
Damage potential of target			
Performance and crop safety of proposed products (from other systems)	A lot of data available already for WFT		X
	Need data on various thrips species other than WFT	X	
Compatibility with IPM, resistance management programs	Insecticide resistance in greenhouse thrips populations is common; hence, resistance management is essential	X	
Economics			
Geographic distribution			
Manufacturer interest in labeling products	Three + unregistered tools to screen	X	
Other	Some growers not utilizing effective resistance management strategies therefore resistant thrips spreading (not necessarily a specific project con)		X
	Successful project for registrations	X	
2015 comments: Outdoor thrips testing preferred (WFT, onion thrips, chilli thrips, pear thrips, etc.)			

IR-4 Efficacy Trials to Date

Average rating on a scale of 1 – 5 with 1 = 0 to about 50% efficacy (not effective) and 5 = 95 to 100 efficacy (very effective); minimum to maximum rating; number of trials (See table on next page). For product/insect combinations that are blank, IR-4 has not screened this combination.

'Labeled' indicates that this disease species or genera is listed on the label. A rating of 2 or lower is considered unacceptable efficacy (*red text*). A rating of 3 or higher is considered commercially acceptable (black text). Non-labeled, completed product/disease combinations (3 or more trials) with an average rating of 3 or higher are highlighted with *green text*. For disease/product combinations that are blank, IR-4 has not screened this combination.

Products (Active Ingredients)	Chilli (<i>Scirtothrips dorsalis</i>)	Cuban Laurel (<i>Gynaikothrips ficorum</i>)	Gladiolus (<i>Thrips simplex</i>) *	<i>Gynaikothrips uzeli</i>	Orchid (<i>Chaetanaphothrips orchidii</i>)	Privet (<i>Dendrothrips ornatus</i>)	Western Flower (<i>Frankliniella occidentalis</i>)
A16901B 45WG (Cyantraniliprole + thiamethoxam)							3.6 (1 - 5) n7 Labeled
Acelepryn (aka DPX-E2Y45) 1.67 (Chlorantraniliprole)				1.0 (1 - 1) n1			1.8 (1 - 4) n10
Allectus SC (Bifenthrin + Imidacloprid)			5.0 (5 - 5) n1	5.0 (5 - 5) n1 Labeled			1.0 (1 - 1) n1 Labeled
Aloft SC (Clothianadin + bifenthrin)	3.0 (3 - 3) n1						
Aria 50SG (Fonicamid)	4.0 (4 - 4) n1 Labeled		2.0 (2 - 2) n1	1.0 (1 - 1) n1 Labeled			2.4 (1 - 5) n8 Labeled
Avid 0.15EC (Abamectin)	4.0 (4 - 4) n1 Labeled		4.0 (4 - 4) n1	1.0 (1 - 1) n1 Labeled			2.9 (1 - 5) n9 Labeled
AzaGuard (Azadirachtin)							2.0 (1 - 3) n7 Labeled
Azatin XL (Azadirachtin)			3.0 (3 - 3) n1 Labeled	1.0 (1 - 1) n2 Labeled			
BAS 320i (Metaflumizone)							1.3 (1 - 2) n4
BAS 350i (Fipronil)							5.0 (5 - 5) n1
Botanigard 22WP (Beauveria bassiana GHA)							1.0 (1 - 1) n2 Labeled
BotaniGard ES (BioWorks) (Beauveria bassiana Strain GHA)		1.0 (1 - 1) n1 Labeled					2.7 (1 - 5) n3 Labeled
BotaniGard ES (Laverlam International) (Beauveria bassiana)							4.0 (3 - 5) n5 Labeled
Capsil (Blend of polyether-and polymethylsiloxane copolymer and nonionic surfactants)				1.0 (1 - 1) n3			
Carzol SP (Formetanate hydrochloride)			4.0 (4 - 4) n1				
Celero 16WSG (Clothianidin)			4.0 (4 - 4) n1	2.5 (1 - 4) n2			2.3 (1 - 4) n7
Conserve SC (Spinosad)	3.5 (3 - 4) n2 Labeled		4.0 (4 - 4) n1	1.0 (1 - 1) n1		3.0 (3 - 3) n1 Labeled	2.8 (1 - 5) n32 Labeled
Cyclaniliprole (IKI-3106) 50SL (Cyclaniliprole)							5.0 (5 - 5) n1
Diazinon 50W (Diazinon)			5.0 (5 - 5) n1				
Dimethoate 4EC (Drexel) (Dimethoate)					4.0 (3 - 5) n2 Labeled		
Discus (Imidacloprid + cyfluthrin)			5.0 (5 - 5) n1	2.0 (1 - 3) n2 Labeled			
DPX-HGW86 (Cyantraniliprole)							3.7 (2 - 5) n3 Labeled
Dursban 50 W (Chlorpyrifos)				1.0 (1 - 1) n1			
EcoTrol (Rosemary Oil)						1.0 (1 - 1) n1	1.0 (1 - 1) n1

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Flagship 25WG (Thiamethoxam)	3.7 (1 - 5) n3 Labeled		5.0 (5 - 5) n1	2.3 (1 - 3) n3 Labeled		2.0 (2 - 2) n1 Labeled	2.3 (1 - 5) n20 Labeled
Grandevo (MBI 203 DF) (Chromobacterium subtsugae NRRL B-30655)							1.5 (1 - 3) n6 Labeled
Hachi-Hachi EC (Tolfenpyrad)	3.0 (3 - 3) n1 Labeled		4.0 (4 - 4) n1			3.0 (3 - 3) n1 Labeled	3.4 (1 - 5) n20 Labeled
Kontos (BYI 8330 240SC) (Spirotetramat)	1.0 (1 - 1) n3 Labeled		5.0 (5 - 5) n1	1.0 (1 - 1) n1 Labeled		2.0 (2 - 2) n1 Labeled	2.3 (1 - 5) n19 Labeled
Mainspring (A20520A) 200SC (Cyantraniliprole)							3.3 (3 - 4) n4 Labeled
Marathon 1% granular (Imidacloprid)				1.0 (1 - 1) n1 Labeled			
Marathon II (Imidacloprid)			4.0 (4 - 4) n1				
Marathon Ultra (Imidacloprid + cyfluthrin)	3.0 (3 - 3) n1 Labeled						1.0 (1 - 1) n1 Labeled
Mesurool 75-W (Methicarb)			4.0 (4 - 4) n1				2.6 (1 - 5) n5 Labeled
Met52 (Metarhizium anisopliae strain F52)							1.0 (1 - 1) n2 Labeled
MilStop (Potassium bicarbonate)		1.0 (1 - 1) n1		1.0 (1 - 1) n1			
MOI 201 (MOI 201)						1.0 (1 - 1) n1	2.4 (1 - 4) n7
OHP 929-2 (OHP 929-2)							3.0 (1 - 5) n2
Orthene TTO 97 (Valent) (Acephate)			5.0 (5 - 5) n1	2.0 (2 - 2) n1 Labeled			
Overture 35WP (Pyridalyl)	3.0 (3 - 3) n1 Labeled		4.0 (4 - 4) n1	1.0 (1 - 1) n1 Labeled			3.7 (1 - 5) n10 Labeled
Pedestal (Novaluron)			5.0 (5 - 5) n1 Labeled				
Proud 3 (Thyme oil (5.6%))							2.1 (1 - 5) n7
Pylon (Chlorfenapyr)	5.0 (5 - 5) n1 Labeled		4.0 (4 - 4) n1				3.6 (1 - 5) n14 Labeled
QRD 400 (Extract of <i>Chenopodium ambrosioides</i>)	1.0 (1 - 1) n1						3.5 (3 - 4) n2
QRD 416 (Extract of <i>Chenopodium ambrosioides</i>)							1.0 (1 - 1) n2
Rotation: Aria / Botanigard (Fonicamid + Beauveria bassiana)							2.0 (2 - 2) n1
Rotation: Aria / TickEx (Fonicamid + Metarhizium anisopliae)							2.0 (2 - 2) n1
Rotation: Aria / Tolfenpyrad / Pylon (Fonicamid / tolfenpyrad / chlorfenapyr)							3.0 (1 - 5) n2
Rotation: Botanigard / Hachi-Hachi (Beauveria bassiana / tolfenpyrad)							3.5 (3 - 4) n2

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Rotation: Botanigard + MoltX / Botanigard (Beauveria bassiana + BW533)							1.6 (1 - 3) n5
Rotation: Botanigard + SuffOil-X / Botanigard (Beauveria bassiana + paraffin oil)							1.8 (1 - 3) n6
Rotation: Conserve / Tolfenpyrad / Pylon (Spinosad / tolfenpyrad / chlorfenapyr)							5.0 (5 - 5) n1
Rotation: NNI-0101 / Tolfenpyrad (NNI-0101 / tolfenpyrad)							1.0 (1 - 1) n1
Rotation: Tick-Ex / Hachi-Hachi (Metarhizium anisopliae / tolfenpyrad)							3.5 (2 - 5) n2
Rycar (SP3009/NNI-0101) (Pyrifluquinazon)			3.0 (3 - 3) n1			3.0 (3 - 3) n1	1.4 (1 - 4) n13
S1812 35WP VC1638 (Pyridalyl)							3.5 (2 - 5) n4
Safari 20SG (Dinotefuran)	4.0 (4 - 4) n2 Labeled		5.0 (5 - 5) n1 Labeled	2.5 (1 - 4) n2 Labeled			2.5 (1 - 3) n4 Labeled
Safari 2G (V-10112 2G) (Dinotefuran)	3.0 (3 - 3) n1						
Safer Soap (Potassium Salts of Fatty Acids)				1.0 (1 - 1) n2 Labeled			
Scimitar CS (Lambda-cyhalothrin)						4.0 (4 - 4) n1 Labeled	1.0 (1 - 1) n2 Labeled
Sevin SL (Carbaryl)				1.0 (1 - 1) n1			
Surround WP (Kaolin Clay)				4.0 (4 - 4) n1 Labeled			
Talstar Flowable Insecticide/Miticide (Bifenthrin)			4.0 (4 - 4) n1				
Talstar NF (Bifenthrin)				4.8 (4 - 5) n4 Labeled			
Tank Mix: A16901B + CA4803A (A169091B + CA4803A)							5.0 (5 - 5) n2
Tank Mix: Aria + NNI-0101 (Fonicamid + NNI-0101)							3.3 (1 - 5) n3 **
Tank Mix: BotaniGard + Tick-Ex (Beauveria bassiana + Metarhizium anisopliae)							1.0 (1 - 1) n3
Tank Mix: Botanigard 22WP + BW130 (Beauveria bassiana + BW130)							3.0 (3 - 3) n1
Tempo Ultra (Cyfluthrin)				2.0 (2 - 2) n1			
TickEx EC (Metarhizium anisopliae)						3.0 (3 - 3) n1 Labeled	1.6 (1 - 5) n15 Labeled
TriCon (BW 420) (Sodium tetraborahydrate decahydrate)			1.0 (1 - 1) n1	1.0 (1 - 1) n1			3.3 (1 - 5) n6
TriStar 30SG (Acetamiprid)	4.0 (3 - 5) n2 Labeled		5.0 (5 - 5) n1				2.4 (1 - 5) n5 Labeled

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Venerate (MBI 206 F) (Burkholderia rinojensis strain A396)							1.3 (1 - 2) n8
Xxpire (GF-2860) 40WG (Spinetoram + sulfoxaflor)							2.0 (2 - 2) n3

*Note: the Gladiolus thrips experiment was a bulb dip treatment prior to storage. These results will not translate to foliar applications.

** This tank mix combination performed well. Each component is registered as individual products and may be tank mixed together.