

Project Name: Mite Efficacy

Dates Active: 2009-2011; 2014-2015; 2022-2023

Project Description:

Mite species can be very difficult to manage because of their often-cryptic nature and ability to rapidly reproduce. The key to management is a combination of excellent product application techniques for optimal plant coverage and a good rotational program among different IRAC mode of action classes to reduce resistance development. Spider mites, often the most prevalent mite group, are well studied during the development process for new miticides. However, other species may not be screened including broad mites and eriophyid mites. This project started as a regional issue in 2009 screening currently registered products as well as new materials. Eriophyid and similar mites became a regional priority at the 2021 workshop.

Research Project Abstract:

Abstract from 2019 Mite Efficacy: A Literature Review

From 1999 to 2016, 34 active ingredients were tested mainly as foliar applications against several genera and species of mite pests on ornamentals and vegetables. Mite species tested included: broad mite, *Polyphagotarsonemus latus*, Eriophyid mites including *Aceria sp.*, *Aculops lycopersici*, *Aculus ligustri*, *Aculus schlechtendali*, *Epitrimerus pyri*, spider mites including *Tetranychus urticae*, *Oligonychus ilicis* and *Panonychus citri*, and the red palm mite *Raoiella indica*. Although there were insufficient data for definitive conclusions, Akari/Fujimite (fenpyroximate), Magus (fenazaquin) and Pylon (chlorfenaphyr), generally performed well on various species. Kontos/Movento/BYI 08330 (spirotetramat) looked promising on the *Eriophyids* *Aceria sp.* and *Aculus ligustri* and on the spider mites *P. citri* and *T. urticae*. Proclaim (emamectin benzoate) was promising on the *Eriophyids* *Aceria sp.* and *Aculus ligustri* and on *P. latus*. Mesa/Ultiflora (milbemectin) looked promising on the *Eriophyids* *A. ligustri*, *Aculus schlechtendali*, *Epitrimerus pyri* and *Aculops lycopersici*, and on the spider mites *T. urticae*. Shuttle (acequinocyl) looked promising on Southern red mite. On red palm mite, limited data indicated that Forbid/Judo (spiromesifen), Pylon, Sanmite (pyridaben), Shuttle (acequinocyl) and Sulfur/Thiolux (sulfur) performed well while Avid (abamectin), Hexagon (hexythiazox) and Tetrasan (etoxazole) were less effective. Tank-mix combination with oils generally improved mite control.

Target Species (Phytotoxicity, or common and Latin name of arthropod, pathogen, weed):	
Broad Mite (<i>Polyphagotarsonemus latus</i>) Eriophyid Mite (<i>Aceria</i>) (<i>Aceria sp.</i>) Hedge Privet Rust Mite (<i>Aculus ligustri</i>) Mite, Southern red (<i>Oligonychus ilicis</i>) Red Palm Mite (<i>Raoiella indica</i>)	Spider Mite, Honeylocust, Spruce (<i>Oligonychus ununguis</i>) Spider Mite, Two-Spotted (<i>Tetranychus urticae</i>)

Target Crops (list tested crops if ongoing or completed project)	
Camellia (<i>Camellia</i> sp.) Palm, Parlor; Neanthe Bella (<i>Chamaedorea elegans</i>) Palm, Coconut (<i>Cocos</i> sp.) Cotoneaster (<i>Cotoneaster</i> sp.) <i>C. apiculatus</i> Dieffenbachia (<i>Dieffenbachia</i> sp.) New Mexico Privet, Desert Olive (<i>Forestiera neomexicana</i>) Locust (<i>Gleditsia</i> sp.) <i>G. triacanthose inermis</i> Holly (<i>Ilex</i> sp.) 'Blue Princess' Impatiens, New Guinea (<i>Impatiens hawkeri</i>) Impatiens, New Guinea (<i>Impatiens hawkeri</i>) <i>I. hawkeri</i> 'Celebrette Purple' Privet, Chinese (<i>Ligustrum sinense</i>) Variegatum Schefflera (<i>Schefflera</i> sp.) <i>S. actinophylla</i> and <i>arboricola</i> Marigold (<i>Tagetes</i> sp.) 'Queen Sophia'	
Target Product(s)(list tested products or numbered compounds if ongoing or completed project)	
Acelepryn (Dupont) (Chlorantraniliprole)* Akari 5SC (Fenpyroximate) Arena 50WDG (Clothianadin)* Aria 50SG (Flonicamid)* Avid 0.15EC (Abamectin) Cygon 2E (Dimethoate) DPX-HGW86 (Cyantraniliprole)* Enfold (Emamectin benzoate) EpiShield (Peppermint oil, clove oil, and sodium lauryl sulfate) Flagship 25WG (Thiamethoxam)* Floramite (Bifenazate) Grandevo (MBI 203 DF) (<i>Chromobacterium subtsugae</i> NRRL B-30655) Hexygon (Hexythiazox) ISM-555 (ISM-555, A21377X) Judo 2SC (Spiromesifen) Kontos 240SC (Spirotetramat) Magus (Fenazaquin) Merit 75WP (Imidacloprid)* OAT 1401EC (RM-1963K) (RM-1963K) Orthene TTO 97 (Valent) (Acephate) Ovation SC (Clofentezine) Proclaim (Emamectin benzoate) Proclaim 5SG (Emamectin benzoate) Pylon (Chlorfenapyr)	Safari 20SG (Dinotefuran)* Sanmite (BASF) (Pyridaben) Shuttle 15SC (Acequinocyl) SP3014 (SP3014) SuffOil X (Synergy) (Mineral oil) Talstar Flowable Insecticide/Miticide (Bifenthrin)* Talus 40SC (Buprofezin)* Temik 10G (aldicarb) TetraCURB Max (castor oil + rosemary oil + clove oil + peppermint oil) Tetrasan (Etoxazole) Thiolux 80DF (Sulfur) TickEx EC (<i>Metarhizium anisopliae</i>) TriStar 30SG (Acetamiprid)* Ultiflora (Milbemectin)

*= tested against spider mites only

Product Registration and Research Status				
	Fully Screened (also includes standards)	Partially Screened through IR-4 ¹	Need Data for Additional Species ?	
Labeled for Mites Generally & Commercialized	Akari Avid, Minx Dursban Horticultural Oil Scimitar		BotaniGard MAXX Floramite Grandevo Judo Kontos Magus	Met-52, Tick-Ex Pylon Tetrasan Ultiflora Xpectro OD
Labeled for Mites Generally But NOT Commercialized				
Labeled for Specific Mites & Commercialized		Hexygon Ovation Sanmite	Kelthane ProMITE	Sirocco Tame
Labeled for Specific Mites but NOT Commercialized				
Not yet registered or labeled for Mites		Acelepryn Arena 50WDG Aria 50SG Emamectin benzoate ISM-555 MBI-203 NI01ES-1 OAT-1401E (RM-1963K) TetraCurb Max	Sultan Venerate (MBI 206 F)	
No longer available for development for Mites		Cygon 2E		
* 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				

IR-4 Efficacy Trials to Date
Average rating on a scale of 1 – 5 where 1 = <60% Control (not effective), 2 = 60-79% control, 3 = 80-89% control, 4 = 90-94% control and 5 = 95-100% control; minimum to maximum rating; number of trials (See table on next page). For product/pest combinations that are blank, IR-4 has not screened this combination. A rating of 3 or higher is considered commercially acceptable. 'Labeled' indicates that this pest species or genera is listed on the label.

Environmental Horticulture Program Research Project Sheet

<https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-extension-resources/>

MOA	Product (Actives)	Broad Mite (<i>Polyphagotarsonemus latus</i>)	Eriophyid Mite (<i>Aceria</i>) (<i>Aceria</i> sp.)	Hedge Privet Rust Mite (<i>Aculus ligustri</i>)	Southern red mite (<i>Oligonychus ilicis</i>)	Red Palm Mite (<i>Raoiella indica</i>)
FRAC BM02	Grandevo (MBI 203 DF) (<i>Chromobacterium subtsugae</i> NRRL B-30655)	1.0 (1 - 1) n1 Labeled				
FRAC M2	Thiolux 80DF (Sulfur)					3.0 (3 - 3) n1
FRAC NC	SuffOil X (Synergy) (Mineral oil)	3.0 (3 - 3) n1 Labeled				
IRAC 10A	Hexygon (Hexythiazox)		1.0 (1 - 1) n1	1.0 (1 - 1) n1		1.0 (1 - 1) n1
IRAC 10A	Ovation SC (Clofentezine)				5.0 (5 - 5) n1	2.0 (2 - 2) n1
IRAC 10B	Tetrasan (Etoxazole)					1.7 (1 - 3) n3
IRAC 13	Pylon (Chlorfenapyr)	5.0 (5 - 5) n1 Labeled		5.0 (5 - 5) n1 Labeled		2.0 (2 - 2) n1 Labeled
IRAC 13 +	Tank Mix: Pylon + Horticultural Oil (Chlorfenapyr + Mineral oil)	5.0 (5 - 5) n1				
IRAC 13 +	Tank Mix: Pylon + SuffOil X (Chlorfenapyr + Paraffinic oil)	5.0 (5 - 5) n1				
IRAC 1B	Cygon 2E (Dimethoate)		2.0 (2 - 2) n1			
IRAC 1B	Orthene TTO 97 (Valent) (Acephate)		1.0 (1 - 1) n1			
IRAC 20B	Shuttle 15SC (Acequinocyl)				5.0 (5 - 5) n1	3.0 (3 - 3) n1
IRAC 20D	Floramite (Bifenazate)				5.0 (5 - 5) n1	
IRAC 21	Sanmite (BASF) (Pyridaben)				5.0 (5 - 5) n1 Labeled	5.0 (5 - 5) n1 Labeled
IRAC 21A	Akari 5SC (Fenpyroximate)		2.0 (2 - 2) n1	5.0 (5 - 5) n1		
IRAC 21A	Magus (Fenazaquin)	3.0 (3 - 3) n1 Labeled	4.0 (4 - 4) n1 Labeled	5.0 (5 - 5) n1 Labeled		
IRAC 23	Judo 2SC (Spiromesifen)					5.0 (5 - 5) n1 Labeled
IRAC 23	Kontos 240SC (Spirotetramat)	2.0 (2 - 2) n2	3.0 (3 - 3) n1	5.0 (5 - 5) n1		5.0 (5 - 5) n1

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IRAC 6	Avid 0.15EC (Abamectin)	5.0 (5 - 5) n1 Labeled		5.0 (5 - 5) n1 Labeled		2.3 (1 - 5) n3 Labeled
IRAC 6	Enfold (Enamectin benzoate)		4.0 (4 - 4) n1			
IRAC 6	Proclaim 5SG (Enamectin benzoate)	5.0 (5 - 5) n1		5.0 (5 - 5) n1		
IRAC 6	Ultiflora (Milbemectin)		1.0 (1 - 1) n1	5.0 (5 - 5) n1		2.0 (2 - 2) n1
IRAC 6 +	Tank Mix: Avid 2EC + Oil (Abamectin + Oil)		4.0 (4 - 4) n1			
IRAC UNF	TickEx EC (Metarhizium anisopliae)			3.0 (3 - 3) n1 Labeled		
unknown	Temik 10G (aldicarb)		5.0 (5 - 5) n1			

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MOA	Product_Actives	Spider Mite, Honeylocust, Spruce (<i>Oligonychus ununguis</i>)	Two-Spotted Spider Mite (<i>Tetranychus urticae</i>)
IRAC 16	Talus 40SC (Buprofezin)		1.0 (1 - 1) n1
IRAC 1B	Orthene TTO 97 (Valent) (Acephate)		1.0 (1 - 1) n1
IRAC 21A	Akari 5SC (Fenpyroximate)		5.0 (5 - 5) n1
IRAC 28	Acelepryn (Dupont) (Chlorantraniliprole)	1.0 (1 - 1) n1	
IRAC 28	DPX-HGW86 (Cyantraniliprole)	1.0 (1 - 1) n1	
IRAC 29	Aria 50SG (Flonicamid)		1.0 (1 - 1) n1
IRAC 3A	Talstar Flowable Insecticide/Miticide (Bifenthrin)	1.0 (1 - 1) n1	
IRAC 4A	Arena 50WDG (Clothianadin)	1.0 (1 - 1) n1	
IRAC 4A	Flagship 25WG (Thiamethoxam)		2.0 (2 - 2) n1
IRAC 4A	Merit 75WP (Imidacloprid)	1.0 (1 - 1) n1	
IRAC 4A	Safari 20SG (Dinotefuran)	1.0 (1 - 1) n1	5.0 (5 - 5) n1
IRAC 4A	TriStar 30SG (Acetamiprid)		1.0 (1 - 1) n1
IRAC 6	Avid 0.15EC (Abamectin)		5.0 (5 - 5) n3