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**IR-4 Ornamental Horticulture Program  
Mite Efficacy: A Literature Review**

*Aceria* sp.  
*Aculops lycopersici*  
*Aculus ligustri*  
*Aculus schlechtendali*  
*Epitrimerus pyri*  
*Oligonychus ilicis*  
*Panonychus citri*  
*Polyphagotarsonemus latus*  
*Raoiella indica*  
*Tetranychus urticae*

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## Abstract

At the IR-4 Ornamental Horticulture Program Workshop in 2009, Mite Efficacy was selected as a high priority project to obtain data supporting current and future registrations was discussed. There are many different species of mites causing injuries on ornamental horticulture crops, and an extensive project may be required to generate sufficient efficacy data to substantially impact product registrations. This summary contains efficacy on mite species collected through the IR-4 Project and data published in Arthropod Management Tests on fruit and vegetable crops. From 1999 to 2011, 26 active ingredients were tested mainly as foliar applications against several genera and species of mite pests. Mite species tested included: broad mite, *Polyphagotarsonemus latus*, Eriophyid mites including *Aceria* sp., *Aculops lycopersici*, *Aculus ligustri*, *Aculus schlechtendali*, *Epirimerus pyri*, spider mites including *Tetranychus urticae*, *Oligonychus ilicis* and *Panonychus citri*, and the red palm mite *Raoeilla 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*, *Epirimerus pyri* and *Aculops lycopersici*. 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), Hexygon (hexythiazox) and Tetrasan (etoxazole) were less effective. Tank-mix combination with oils generally improved mite control.

## Introduction

At the IR-4 Ornamental Horticulture Program Workshop in 2009, Mite Efficacy was selected as a high priority project to obtain data supporting current and future registrations was discussed. There are many different species of mites causing ornamental injuries and an extensive project may be required to generate sufficient efficacy data. We reviewed available ornamental and vegetable trials published in Arthropod Management Tests (AMT) to control efficacy of experimental and registered miticides on important ornamental mite pests. This report is a brief summary of available data from 8 ornamental trials from the IR-4 Ornamental Horticulture Program, and 12 vegetable trial reports published in AMT; the source of AMT report is included under each data table.

## Materials and Methods

From 1999 to 2011, 26 active ingredients were tested against several genera and species of mite pests of ornamentals, fruits, and vegetables (Tables 1 and 2). These genera/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 *Raoeilla indica*. Treatments were generally applied as foliar sprays. A minimum of four plants (replicate treatments) were required with most researchers exceeding this minimum. Insect counts were recorded pre-treatment and then generally at 7, 14 (prior to 2<sup>nd</sup> application), 28 and 42 days after initial application. Phytotoxicity was recorded on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill) at each rating date. For more detailed materials and methods, including application rates for various products, please visit <http://ir4.rutgers.edu/ornamental/OrnamentalDrafts.cfm> to view and download these protocols.

Products were supplied to researchers (See list of researchers in Appendix 1) by their respective manufacturers.

**Table 1. List of Products and Rates Tested on Ornamental Horticulture Crops from 1999 to 2011.**

Active Ingredient(s)	Trade Name(s)		Manufacturer	Rate(s) Tested		# Trials
	Food Use	Orn.Hort./Turf Use				
Abamectin	Agri-Mek, Avid	Minx	Syngenta	Spray	4 fl oz per 100 gal 8 fl oz per 100 gal	6
Acephate	Orthene	Orthene	Valent	Spray	1 lb per 100 gal	1
Acequinocyl	Kanemite	Shuttle	Arysta	Spray	6.4 fl oz per 100 gal 12.8 fl oz per 100 gal 31 fl oz per acre	3
Acetamiprid	Assail	Tristar	Cleary, UPI	Spray	112 g per 100 gal 224 g per 100 gal 2.3 oz per 100 gal	2
Bifenazate	Acramite	Floramite	Chemtura, OHP	Spray	4 fl oz per 100 gal 8 fl oz per 100 gal	2
Buprofezin	Applaud	Talus	Nichino, SePro	Spray	18 fl oz per 100 gal	1
Chlorfenaphyr	Pylon	Pylon	BASF	Spray	2.6 fl oz per 100 gal 4 fl oz per 100 gal 5.6 fl oz per 100 gal	4
<i>Chromobacterium subtsugae</i> NRRL B-30655.	MBI 203	MBI 203	Marrone	Spray	1 % solution 5 % solution	1
Clofentezine		Ovation	Scotts	Spray	2 fl oz per 100 gal 8 fl oz per 100 gal	2
Dinotefuran	Venom	Safari	Valent	Drench	12 oz per 100 gal 24 oz per 100 gal 2.84 oz per 100 gal	2
				Spray	4 oz per 100 gal 8 oz per 100 gal	1
Emamectin Benzoate	Proclaim		Syngenta	Spray	4 oz per 100 gal 8 oz per 100 gal	3
Etoxazole	Zeal	Tetrasan	Valent	Spray	10 oz per 100 gal 16 oz per 100 gal	3
Fenazaquin	Magus	Magus	Gowan	Spray	12 fl oz per 100 gal 24 fl oz per 100 gal	3
Fenpyroximate	Fujimite	Akari	Nichino, SePro	Spray	24 fl oz per 100 gal	3
Flonicamid	Beleaf	Aria	FMC	Spray	60 g per 100 gal 120 g per 100 gal	1

Active Ingredient(s)	Trade Name(s)		Manufacturer	Rate(s) Tested		# Trials
	Food Use	Orn.Hort./Turf Use				
Hexythiazox	Onager, Savey	Hexygon	Gowan	Spray	2 oz per 100 gal	3
<i>Metarhizium anisopliae</i>	Tick Ex	Tick Ex	Novozymes	Spray	29 fl oz per 100 gal	1
Milbemectin	Mesa	Ultiflora	Gowan	Spray	16 fl oz per 100 gal	3
Petroleum Oil		SuffOil X	BioWorks	Spray	1 gal per 100 gal	1
Pyridaben	Pyramite	Sanmite	Gowan	Spray	4 oz per 100 gal 6 oz per 100 gal	3
Spiromesifen	Oberon	Forbid, Judo	Bayer, OHP	Spray	2 fl oz per 100 gal	1
Spirotetramat	Movento	Kontos, BYI 08330	Bayer, OHP	Drench	50 ml per 1100 pots 0.38 fl oz per 100 gal 0.64 fl oz per 100 gal 0.96 fl oz per 100 gal 1.28 fl oz per 100 gal	2
				Spray	1.7 fl oz per 100 gal 2.5 fl oz per 100 gal 3.4 fl oz per 100 gal	4
Sulfur	Microthiol Disperss	Microthiol Disperss, Sulfur, Thiolux	UPI, etc.	Spray	2.5 gal per 100 gal 10 lb per 100 gal	2
Thiamethoxam	Platinum	Flagship, Meridian	Syngenta	Spray	1 oz per 100 gal 2 oz per 100 gal 4 oz per 100 gal	2

**Table 2. List of Products and Rates Tested on Food Crops from 2002 to 2010.**

Active Ingredient(s)	Trade Name(s)		Manufacturer	Rate(s) Tested	# Trials
	Food Use	Orn.Hort./Turf Use			
Abamectin	Agri-Mek, Avid	Minx	Syngenta	Spray 8 fl oz per acre 10 fl oz per acre 12 fl oz per acre 16 fl oz per acre	8
Acequinocyl	Kanemite	Shuttle	Arysta	Spray 31 fl oz per acre 46.5 fl oz per acre	3
Bifenazate	Acramite	Floramite	Chemtura, OHP	Spray 1 lb per acre	3
Emamectin Benzoate	Proclaim		Syngenta	Spray 3.6 oz per acre 8 oz per acre	2
Fenpyroximate	Fujimite	Akari	Nichino, SePro	Spray 30.5 fl oz per acre 32 fl oz per acre 45.8 fl oz per acre	3
Milbemectin	Mesa	Ultiflora	Gowan	Spray 16 fl oz per acre 20 fl oz per acre 25 fl oz per acre 30 fl oz per acre 36 fl oz per acre	6
Oxamyl	Vydate		DuPont	Spray 2 qt per acre	1
Pyridaben	Pyramite	Sanmite	BASF	Spray 6.6 oz per acre	1
Spirodiclofen	Envidor		Bayer	Spray 7 fl oz per acre 16 fl oz per acre 20 fl oz per acre	3
Spiromesifen	Oberon	Forbid, Judo	Bayer, OHP	Spray 8.5 fl oz per acre 12.8 fl oz per acre	3
Spirotetramat	Movento	Kontos, BYI 08330	Bayer, OHP	Spray 5 fl oz per acre 10 fl oz per acre	2



## Results and Summary

### ***Comparative Efficacy on Broad Mites***

The broad mite, *Polyphagotarsonemus latus*, (family *Tarsonemidae*) is distributed world-wide and has a large host range in Australia, Asia, Africa, Europe, North America, South America, and the Pacific Island. Broad mites infest food crops and many ornamentals, including African violet, ageratum, azalea, begonia, chrysanthemums, cyclamen, dahlia, gerbera, gloxinia, ivy, jasmine, impatiens, lantana, marigold, pittosporum, snapdragon, verbena and zinnia. It is considered a serious pest of *Pittosporum* spp. in Florida. This destructive pest causes terminal leaves and flower buds to become malformed, and its toxic saliva causes twisted, hardened and distorted growth in the terminal of the plant.

**Gilrein 2010.** In 2010, Gilrein conducted an experiment to examine various products for control of broad mites on New Guinea impatiens (Table 3). Broad mites, *Polyphagotarsonemus latus*, were repeatedly placed on New Guinea impatiens (*Impatiens x hawkeri*) ‘Celebrette Purple’ to establish sufficient populations for testing. Initial counts of motile mites and healthy eggs on six partially-expanded terminal leaves per plant were taken prior to application of either foliar or drench treatments. Subsequent mite counts were collected weekly through 4 weeks after treatment. Avid, Proclaim, Pylon and the Pylon + oil combinations, provided the greatest level of initial and residual control. Kontos drench or foliar, Magus and SuffOil X provided less residual activity, and MBI 203 was ineffective. Plants treated with the Pylon + Ultra-Pure oil combination showed severe leaf burn and bud injury after the second application; Pylon + Suffoil also showed slight leaf burn, primarily at the leaf tips. No other treatments exhibited any signs of phytotoxicity.

**Table 3. Efficacy on Broad mite (*Polyphagotarsonemus latus*) on New Guinea Impatiens (*Impatiens x hawkerii*) ‘Celebrette Purple’, Gilrein, NY, 2010.**

Treatment	Rate Per 100 Gal	Applic. Dates	Number of Mites Per Plant <sup>x</sup>					Phyto Rating <sup>y</sup> 1/6/11
			Pretreatment 12/7/10	12/14/10	12/21/10	12/28/10	1/4/11	
Avid 0.15EC (abamectin)	8 fl oz	12/10, 12/20	8.1 a	0.1 e (99)	0.1 d (99)	-	0.0 g (100)	0.0 c
Kontos 2SC (spirotetramat) drench	50 ml/1100 pots	12/10	7.6 a	16.4 a (11)	3.3 cd (80)	-	2.6 efg (79)	0.0 c
Kontos 2SC	3.4 fl oz	12/10, 12/24	8.3 a	6.5 a-d (68)	5.6 bc (69)	4.0 b (80)	4.5 d-g (67)	0.2 c
Magus 1.6SC (fenazaquin)	12 fl oz	12/10	8.4 a	4.3 b-e (79)	4.3 cd (77)	-	11.8a-d (15)	0.0 c
Magus 1.6SC	24 fl oz	12/10	7.5 a	0.9 de (95)	2.3 cd (86)	-	5.9 c-f (53)	0.1 c
MBI 203 EP ( <i>Chromobacterium subtsugae</i> )	5 %	12/10, 12/20	9.4 a	15.1 abc (34)	13.6 ab (34)	-	15.1 ab (3)	0.1 c
MBI 203 EP	1 %	12/10, 12/20	7.5 a	11.0 ab (40)	13.8 (16)ab	-	20.9 a (0)	0.0 c
Proclaim 5SG (emamectin benzoate)	4 oz	12/10, 12/20	9.8 a	2.0 cde (92)	0.9 d (96)	-	0.4 fg (98)	0.0 c
Proclaim 5SG	8 oz	12/10, 12/20	7.3 a	1.3 de (93)	0.4 d (98)	-	0.4 fg (97)	0.0 c
Pylon 2SC (chlorfenaphyr)	5.6 fl oz	12/10, 12/20	10.1 a	0.6 de (100)	0.1 d (99)	-	0.1 g (99)	0.0 c
Pylon 2SC + Ultra-Pure Oil	5.6 fl oz + 1 %	12/10, 12/20	8.0 a	0.0 e (100)	0.1 d (99)	-	0.3 fg (98)	6.4 a
Pylon 2SC + Suffoil X	5.6 fl oz + 1 %	12/10, 12/20	7.6 a	0.0 e (100)	0.4 d (98)	-	0.1 g (99)	1.1 b
Suffoil X	1 %	12/10, 12/20	8.0 a	2.3 de (88)	1.3 cd (93)	-	8.6 b-e (35)	0.0 c
Untreated	-	-	8.8 a	21.4 a (0)	19.3 a (0)	21.4 a (0)	14.6 abc (0)	0.0 c
<b>Number of Eggs Per Plant<sup>x</sup></b>								
Avid 0.15EC (abamectin)	8 fl oz	12/10, 12/20	10.4 a	1.0 def (94)	0.1 e (99)	-	0.0 g (100)	
Kontos 2SC (spirotetramat) drench	50 ml/1100 pots	12/10	10.6 a	7.8 a-d (71)	1.1 de (90)	-	0.4 efg (95)	
Kontos 2SC	3.4 fl oz	12/10, 12/24	7.9 a	4.6 b-f (62)	5.5 bcd (30)	2.8 b (67)	2.6 def (56)	
Magus 1.6SC (fenazaquin)	12 fl oz	12/10	17.3 a	7.8 b-e (71)	9.3 (46)abc	-	12.3 a-d (2)	

Treatment	Rate Per 100 Gal	Applic. Dates	Number of Mites Per Plant <sup>x</sup>					Phyto Rating <sup>y</sup> 1/6/11
			Pretreatment 12/7/10	12/14/10	12/21/10	12/28/10	1/4/11	
Magus 1.6SC	24 fl oz	12/10	12.9 a	2.4 def (88)	3.4 c (74)de	-	9.1 cde (6)	
MBI 203 EP ( <i>Chromobacterium subtsugae</i> )	5 %	12/10, 12/20	13.4 a	17.1 ab (17)	19.3a (0)	-	17.6 ab (0)	
MBI 203 EP	1 %	12/10, 12/20	10.6 a	11.9 abc (27)	17.5ab (0)	-	20.0 a (0)	
Proclaim 5SG (emamectin benzoate)	4 oz	12/10, 12/20	11.9 a	2.0 def (89)	1.4 de (88)	-	0.0 g (100)	
Proclaim 5SG	8 oz	12/10, 12/20	12.9 a	0.9 ef (95)	0.3 e (98)	-	0.0 g (100)	
Pylon 2SC (chlorfenaphyr)	5.6 fl oz	12/10, 12/20	14.8 a	2.4 c-f (89)	0.8 e (95)	-	0.0 g (100)	
Pylon 2SC + Ultra-Pure Oil	5.6 fl oz + 1 %	12/10, 12/20	11.6 a	1.5 def (92)	0.3 e (97)		0.0 g (100)	
Pylon 2SC + Suffoil X	5.6 fl oz + 1 %	12/10, 12/20	8.6 a	0.3 f (98)	0.6 e (93)	-	0.0 g (100)	
Suffoil X	1 %	12/10, 12/20	10.3 a	2.9 c-f (82)	2.4 de (77)	-	8.9 b-e (0)	
Untreated	-	-	17.0 a	26.1 a (0)	17.0 ab (0)	18.0 a (0)	12.8 abc (0)	

<sup>x</sup> Means followed by same letter do not differ significantly based on Tukey's HSD (P=0.05).

<sup>y</sup> Phyto rating: scale of 0 to 10 (0 = no phytotoxicity; 10 = complete kill).

**Schuster.** In 2003 and 2007, Schuster conducted 2 experiments to examine various miticides for efficacy on broad mite (*Polyphagotarsonemus latus*) on bell pepper (*Capsicum annuum*). The products tested included Acramite (bifenazate), Agri-Mek (abamectin), Mesa (milbemectin) and Oberon (spiromesifen). In 2003, Agri-Mek, Mesa and Oberon provided good to excellent control of heavy infestations, better than Acramite (Table 4). Both treatments in 2007 - Agri-Mek and Mesa - provided good to excellent control of heavy infestations (Table 5).

**Table 4. \* Efficacy on Broad mite (*Polyphagotarsonemus latus*) on Bell Pepper (*Capsicum annuum*) ‘Brigadier’, Schuster, FL, 2003.**

Treatment	Rate Per Acre	Number Motiles Per 10 Plants <sup>x</sup>						Damage Rating <sup>y</sup>
		3 DAT1	7 DAT1	3 DAT2	7 DAT2	14 DAT2	21 DAT2	
Acramite 50WS (bifenazate)	1 lb	127 a	111 a	134 ab	7 b	22 b	7 ab	3.7 b
Agri-Mek 0.15EC (abamectin)	8 fl oz	16 d	2 c	1 c	0 c	1 c	1 b	1.3 de
Mesa (milbemectin)	16 fl oz	18 d	3 c	8 c	0 c	0 c	8 ab	1.0 e
Oberon 240SC (spiromesifen) + Induce	8.5 fl oz + 0.05% v/v	22 c	5 c	13 c	1 c	7 c	6 a	1.2 de
Untreated	-	96 ab	129 a	95 b	20 a	91 a	14 a	4.3 a

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 30: E49. Not all products tested included in table.

<sup>x</sup> Means followed by same letter do not differ significantly based on LSD (P=0.05).

<sup>y</sup> Damage rating: 1 = no injury, 2 = light leaf curling and elongation (strapping), 3 = moderate leaf curling and strapping, 4 = heavy leaf curling and strapping, and 5 = death of terminal and lateral growing points.

**Table 5. \* Efficacy on Broad mite (*Polyphagotarsonemus latus*) on Bell Pepper (*Capsicum annuum*) ‘Revolution’, Schuster, FL, 2007.**

Treatment	Rate Per Acre	Number Motiles Per 10 Plants <sup>x</sup>						
		3 DAT1	6 DAT1	13 DAT1	4 DAT2	12 DAT2	20 DAT2	33 DAT
Agri-Mek 0.15EC (abamectin)	8 fl oz	3 b	1 b	6 b	0 b	0 b	1 b	3 b
Mesa (milbemectin)	16 fl oz	2 b	0 b	2 b	0 b	0 b	0 b	6 b
Untreated	-	23 a	32 a	29 a	25 a	54 a	82 a	42 a

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 34: E46. Not all products tested included in table.

<sup>x</sup> Means followed by same letter do not differ significantly based on LSD (P=0.05).

**Liu 2003.** In 2003, Liu examined several products including Agri-Mek (abamectin), Proclaim (emamectin benzoate) and Vydate (oxamyl) for efficacy on broad mite on bell pepper. The standard Agri-Mek provided the best control, followed by Vydate and Proclaim (Table 6).

**Table 6. \* Efficacy on Broad mite (*Polyphagotarsonemus latus*) on Bell Pepper (*Capsicum annuum*) ‘Jupiter’, Liu, TX, 2003.**

Treatment	Rate Per Acre	Application Date(s)	No. Mites <sup>x</sup> Per 4 cm <sup>2</sup>	Damage Rating <sup>y</sup>
Agri-Mek 0.15EC (abamectin)	16 fl oz	9/29, 10/14	0.80 d	0.10 d
Proclaim 5SG (emamectin benzoate)	3.6 oz	10/20	7.20 ab	3.82 c
Vydate 2L (oxamyl)	2 qt	10/14	2.83 d	3.42 c
Untreated	-	-	9.53 a	4.90 a

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 30: E47. Not all products tested included in table.

<sup>x</sup> Means followed by same letter do not differ significantly based on LSD (P=0.05).

<sup>y</sup> Damage rating: 0 = no damage, 1 = minor feeding damage, 2 = minor-moderate feeding damage, 3 = moderate damage, 4 = moderate-heavy damage, and 5 = heavy damage.

### **Comparative Efficacy on Eriophyid Mites**

Eriophyid mites (family Eriophyidae), also known as blister, bud, gall, and rust mites, attack a wide range of ornamental plants, including ash, cherry, crabapple, elm, fir, hemlock, maples, spruce and walnut. They feed deep within the plant tissues (meristematic region), sucking out plant juices with their styletlike mouthparts and transferring a substance or toxin, which causes deformation or abnormalities in the manner they are named for. They usually do not cause serious injury, even large populations can be tolerated by plants, but the damage may be unsightly. Additionally, Eriophyid mites are the only group of mites known to transmit plant viruses.of plant growth.

#### ***Aceria* sp.**

In 2011, Grasswitz conducted an experiment to examine various products applied foliarly on New Mexico olive (*Forestiera pubescens*) trees that were naturally infested with an undescribed species of *Aceria* sp. (Acari: Eriophyidae) that causes the margin of affected leaves to curl downwards, enclosing the mites inside. Mite populations were assessed immediately before treatment and at 7, 14, 21, 28 and 35 days after the first application by counting mites within the rolled margin of 3 leaves per plant under a stereomicroscope. Single or two treatments of Akari, Avid + 1% SuffOil X, Hexygon, Kontos, Magus, Proclaim, and Ultiflora were applied to foliage (Table 7). Kontos, Magus and Proclaim generally provided control comparable to the standard Avid® + 1% SuffOil X; Akari, and Ultiflora were less effective, and Hexygon did not significantly reduce mite infestation. No phytotoxicity was observed in any treatment.

### **Comparative Efficacy on Rust Mites**

**Uber 2010.** In 2010, Uber conducted an experiment to examine efficacy of Akari, Avid, Hexygon, Kontos, Magus, Proclaim, Pylon, Tick Ex and Ultiflora applied foliar on hedge privet rust mites (*Aculus ligustri*) on variegated privet. Prior to and semi-weekly or weekly after first application, a single terminal from each plant (approx 2" in length) was taken from each of the 3 plants in each plot for a total of 3 terminals per single subsample. All treatments except hexygon were reapplied 14 days after the first application; Hexygon was only applied once. Leaf samples were then run through a mite brushing machine to facilitate counting. All stages of the population were then viewed, counted through a stereoscope. All treatments except Hexygon provided excellent control at 21 day after the first application; with Akari, Proclaim and Tick Ex providing slightly lower initial control (Table 8). Although there was an initial population reduction, Hexygon was generally ineffective after 7 DAT.

**Table 7. Efficacy on Eriophyid mite *Aceria* sp. on New Mexico Olive (*Forestiera pubescens* var. *pubescens*) Grasswitz, NM, 2011.**

Treatment	Rate Per 100 Gal	Applic. Dates	Number of Mites Per Leaf <sup>x</sup> (Henderson's % Control)					
			0 DAT	7 DAT*	14 DAT	21 DAT	28 DAT	35 DAT
Akari (fenpyroximate)	24 fl oz	7/20, 8/3	174.4 a	26.0 b (66)	9.6 bcd (57)	12.2 c (67)	7.2 a (47)	11.9 a (0)
Avid 0.15EC (abamectin) + SuffOil X	8 fl oz + 1%	7/20, 7/27	151.8 a	11.5 bc (83)	8.1 d (58)	7.6 c (76)	7.5 a (37)	15.7 a (0)
Hexygon (hexythiazox)	2 oz	7/19	150.3 a	67.3 a (0)	56.9 a (0)	28.3 b (11)	41.7 a (0)	30.9 a (0)
Kontos 2SC (spirotetramat)	3.4 fl oz	7/20, 8/3	152.4 a	28.9 b (57)	5.3 d (73)	7.2 c (78)	4.9 a (59)	7.0 a (0)
Magus 1.6SC (fenazaquin)	24 fl oz	7/20	144.9 a	9.0 c (86)	3.8 d (79)	5.4 c (82)	7.1 a (38)	5.8 a (0)
Proclaim 5SG (emamectin benzoate)	4 oz	7/19, 7/26	141.3 a	26.8 b (57)	5.1 d (72)	3.1 c (90)	5.8 a (48)	9.7 a (0)
Proclaim 5SG	8 oz	7/19, 7/26	158.0 a	29.5 b (57)	5.5 d (73)	7.0 c (79)	5.4 a (56)	13.0 a (0)
Ultiflora (milbemectin)	16 fl oz	7/19, 8/2	145.2 a	24.2 b (62)	12.6 bc (32)	13.2 abc (57)	7.5 a (34)	18.4 a (0)
Untreated	-	-	151.6 a	66.2 a (0)	19.3 ab (0)	32.1 ab (0)	11.9 a (0)	5.7 a (0)

\* DAT refers to days after the first application of any product.

<sup>x</sup> Means followed by same letter do not differ significantly based on Kruskal-Wallis analysis of medians followed by pair-wise comparisons using the Mann-Whitney test (P=0.05).

**Table 8. Efficacy on Hedge Privet Rust Mite (*Aculus ligustri*) on Variegated Privet (*Ligustrum sinense*), Uber, CA, 2011.**

Treatment	Rate Per 100 Gal	Number of Mites Per Leaf <sup>x</sup> (Henderson's % Control)						
		-1 DAT	3 DAT	7 DAT	10 DAT	13 DAT	21 DAT	27 DAT
Akari (fenpyroximate)	24 fl oz	231.0 c	96.0 bc (41)	90.0 bc (54)	24.0 c (86)	9.0 c (97)	0.0 c (100)	9.0 c (99)
Avid 0.15EC (abamectin) + 415 Narrow Range Oil	4 fl oz + 1%	837.0 a	63.0 b-e (91)	21.0 c (97)	12.0 c (98)	9.0 c (99)	12.0 c (99)	3.0 c (100)
Hexygon (hexythiazox)	2 oz	456.0 bc	111.0 b (70)	132.0 b (66)	363.0 a (0)	417.0 a (19)	474.0 b (59)	575.5 b (42)
Kontos 2SC (spirotetramat)	3.4 fl oz	456.0 bc	81.0 b-e (78)	60.0 bc (84)	30.0 c (91)	18.0 bc (97)	9.0 c (99)	3.0 c (100)
Magus 1.6SC (fenazaquin)	24 fl oz	363.0 bc	51.0 cd (83)	57.0 bc (81)	27.0 c (90)	15.0 bc (96)	12.0 c (99)	12.0 c (99)
Proclaim 5SG (emamectin benzoate)	4 oz	192.0 c	33.0 e (79)	39.0 c (76)	24.0 c (83)	9.0 c (96)	12.0 c (98)	6.0 c (99)
Proclaim 5SG	8 oz	147.0 c	39.0 de (68)	36.0 c (71)	27.0 c (75)	15.0 bc 91()	12.0 c (97)	3.0 c (99)
Pylon 2SC (chlorfenaphyr)	2.6 fl oz	459.0 bc	51.0 cde (86)	45.0 bc (88)	9.0 c (97)	9.0 c (98)	6.0 c (99)	36.0 c (97)
Tick Ex ( <i>Metarhizium anisopliae</i> )	29 fl oz	489.0 abc	93.0 bcd (77)	240.0 a (42)	84.0 c (77)	114.0 b (79)	60.0 c (95)	30.0 c (98)
Ultiflora (milbemectin)	16 fl oz	684.0 ab	42.0 cde (92)	48.0 bc (92)	21.0 c (96)	12.0 c (98)	3.0 c (100)	0.0 c (100)
Untreated	-	285.0 c	231.0 a (0)	240.0 a (0)	209.0 b (0)	322.0 a (0)	723.0 a (0)	849.0 a (0)

\* Hexygon applied once On June 4, all other treatments applied twice on June 4 and 12. DAT refers to days after the first application of any product.

<sup>x</sup> Means followed by same letter do not differ significantly based on Kruskal-Wallis analysis of medians followed by pair-wise comparisons using the Mann-Whitney test (P=0.05).

**Wise 2002.** In 2002, Wise examined several miticides, including Envidor (spirodiclofen), Fujimite (fenpyroximate), Mesa (milbemectin) and Pyramite (pyridaben) for efficacy on apple rust mite (*Aculus schlechtendali*) on apple. Envidor, FujiMite and Mesa provided comparable control, while Pyramite looked ineffective (Table 9).

**Table 9. \* Efficacy on Apple Rust Mite (*Aculus schlechtendali*) on Apple (*Malus domestica*), ‘Red Delicious’ Wise, MI, 2002.**

Treatment	Rate Per Acre	No. Motiles Per Leaf <sup>x</sup>	
		20 DAT	33 DAT
Envidor 240SC (spirodiclofen) + BioCover UL	7 fl oz + 1 gal	52.2 bc	37.9 b
Fujimite 5%EC (fenpyroximate)	32 fl oz	59.1 bc	52.8 b
Mesa .078EC (milbemectin) + BioCover UL	20 fl oz + 1 gal	35.6 c	46.5 b
Pyramite 60W (pyridaben)	6.6 oz	78.4 ab	75.2 ab
Untreated	-	99.8 a	74.0 ab

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 28: A19. Not all products tested included in table.

<sup>x</sup> Means followed by same letter do not differ significantly based on LSD (P=0.05).

**Riedl 2004.** In 2004, Riedl conducted an experiment to examine efficacy of Agri-Mek (abamectin) and Mesa (milbemectin) on pear rust mites (*Epirimerus pyri*) on pear. All treatments provided immediate knockdown of mite populations (Table 10). The standard Agri-Mek provided control for up to 55 days after treatment. The low rate of Mesa provided control for approximately 27 days, the higher rate up to 36 days.

**Table 10. \* Efficacy on Pear Rust Mite (*Epirimerus pyri*) on Pear (*Pyrus communis*), ‘d’Anjou’, Riedl, OR, 2004.**

Treatment	Rate Per Acre	Number of Mites Per Leaf <sup>x</sup> (Henderson’s % Control)							
		-1 DAT	7 DAT	13 DAT	20 DAT	27 DAT	36 DAT	55 DAT	63 DAT
Agri-Mek (abamectin) + Oil	10 fl oz + 1 gal	60.8 a	6.0 b (97)	4.3 b (97)	4.0 b (98)	3.3 b (99)	3.1 b (99)	21.4 b (84)	11.6 a (70)
Mesa .078EC (milbemectin) + Oil	25 fl oz + 1 gal	136.6 a	8.5 b (98)	4.0b (99)	8.2 b (98)	29.5 b (96)	109.0 ab (82)	246.6 a (17)	58.0 a (33)
Mesa .078EC (milbemectin) + Oil	30 fl oz + 1 gal	98.8 a	9.0 b (97)	4.7 b (98)	5.0 b (98)	20.3 b (96)	43.6 b (90)	152.9 ab (29)	43.1 a (31)
Untreated	-	37.7 b	135.0 a (0)	90.4 a (0)	127.0 a (0)	204.4 a (0)	169.3 a (0)	82.4 b (0)	23.8 a (0)

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 30: A37. Not all products tested included in table.

<sup>x</sup> Means followed by same letter do not differ significantly based on Fisher’s Protected LSD (P=0.05).



**Schuster.** In 2004 and 2005, Schuster examined several products including Agri-Mek (abamectin), Fujimite (fenpyroximate), Kanemite (acequinocyl), Mesa (milbemectin) and Oberon (spiromesifen) for efficacy on tomato russet mite (*Aculops lycopersici*) on tomato. In both years, the population was heavy at the time of spraying, but declined during the 2 wk after spraying (Table 11 and Table 12). All treatments significantly reduced number of mites at 3 and 7 days after spraying.

**Table 11. \* Efficacy on Tomato Russet Mite (*Aculops lycopersici*) on Tomato (*Lycopersicon esculentum*), ‘Sebring’, Schuster, FL, 2004.**

Treatment	Rate Per Acre	Number of Mites Per 10 Leaflets <sup>x</sup> (Henderson’s % Control)				
		-1 DAT	4 DAT	7 DAT	14 DAT	21 DAT
Agri-Mek 0.15EC (abamectin)	12 fl oz	375 ab	107 b (79)	33 a (87)	21 ab (88)	9 b (0)
Fujimite 5%EC (fenpyroximate)	45.8 fl oz	484 ab	91 b (86)	48 a (76)	56 ab (74)	20 ab (0)
Kanemite 15SC (acequinocyl)	46.5 fl oz	367 ab	94 b (82)	78 a (89)	96 ab (42)	4 b
Mesa 1% EC (milbemectin)	24 fl oz	351 ab	114 b (77)	42 a (83)	13 b (92)	9 b (0)
Mesa 1% EC (milbemectin)	36 fl oz	426 ab	46 b (92)	48 a (84)	40 ab (79)	12 b (0)
Oberon 240SC (spiromesifen) + Induce	12.8 fl oz + 0.05% v/v	408 a	53 b (91)	17 a (94)	23 ab (87)	33 a (0)
Untreated	-	223 b	309 a (0)	153 a (0)	100 a (0)	4 b (0)

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 30: E82. Not all products tested included in table.

<sup>x</sup> Means followed by same letter do not differ significantly (P=0.05, LSD).

**Table 12. \* Efficacy on Tomato Russet Mite (*Aculops lycopersici*) on Tomato (*Lycopersicon esculentum*), ‘Sun Leaper’, Schuster, FL, 2005.**

Treatment	Rate Per Acre	Number of Mites Per 10 Leaflets			
		0 DAT	3 DAT	7 DAT	14 DAT
Agri-Mek 0.15EC (abamectin)	8 fl oz	99 a	9 b (68)	10 b (0)	4 a (0)
Fujimite 5%EC (fenpyroximate)	30.5 fl oz	134 a	19 b (50)	11 b (34)	5 a (0)
Kanemite 15SC (acequinocyl)	31 fl oz	223 a	27 b (57)	12 b (50)	2 a (0)
Mesa 1% EC (milbemectin)	16 fl oz	190 a	19 b (64)	12 b (42)	1 a (0)
Mesa 1% EC (milbemectin)	24 fl oz	103 a	22 b (34)	6 b (46)	3 a (0)
Oberon 240SC (spiromesifen) + Induce	8.5 fl oz + 0.05% v/v	193 a	5 b (91)	7 b (67)	2 a (0)
Untreated	-	203 a	57 a (0)	22 a (0)	1 a (0)

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 31: E76. Not all products tested included in table.

<sup>x</sup> Means followed by same letter do not differ significantly (P=0.05, LSD).

### **Comparative Efficacy on Spider Mites**

Spider mites (family *Tetranychidae*), including twospotted spider mite (*Tetranychus urticae*), European red mite (*Panonychus ulmi*), and citrus red mite (*Panonychus citri*), are perhaps the most important mite pests of ornamental horticulture crops. These are medium-sized mites that feed on a wide variety of host plants including ornamental trees, shrubs and bedding plants. All of these spider mites feed on plant leaves by piercing leaf tissues and sucking the green liquid that oozes out. Leaves appear bronzed after the green color is lost from many tiny feeding spots. Heavily infested leaves and branches can become covered with an almost invisible webbing.

### Twospotted Spider Mite

**Cloyd 2001.** In 2001, Cloyd conducted a greenhouse experiment to examine efficacy of Akari, Pylon, Floramite and Sanmite applied foliar for control of twospotted spider mites (*Tetranychus urticae*) on marigold (Table 13). All the treatments were significantly different from the untreated check, with Pylon providing the highest mortality. Akari was slightly inferior to the other products. No phytotoxicity was observed in any treatment.

**Table 13\*. Efficacy on Twospotted Spider Mite (*Tetranychus urticae*) on Marigold (*Tagetes patula*) ‘Antique Mix’, Cloyd, IL, 2001.**

Treatment	Rate Per 100 Gal	Percent Mortality <sup>x</sup>				
		0 DAT	7 DAT*	14 DAT	21 DAT	28 DAT
Akari 5SC (fenpyroximate)	24.0 fl oz	2.1 a	75.3 b	69.0 b	71.5 b	84.1 b
Floramite 50SC (bifenazate)	4.0 fl oz	1.8 a	74.1 b	97.3 a	89.5 a	93.6 a
Pylon SC (chlorfenapyr)	4.0 fl oz	0.8 a	98.6 a	98.6 a	89.6 a	91.3 a
Sanmite 75WP (pyridaben)	4.0 oz	1.3 a	80.8 b	91.0 a	95.3 a	88.3 ab
Untreated	-	1.3 a	2.3 c	0.1 c	3.5 c	8.8 c

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 28: G26.

<sup>x</sup> Means followed by same letter do not differ significantly based on Fisher’s Protected LSD (P=0.05).

**Davis 2005.** In 2005 mealybug trial conducted by Davis, a heavy population of twospotted spider mites (*Tetranychus urticae*) was present and efficacy of products in the trial was recorded (Table 14). Because of increasing mite population, Floramite, a registered miticide, was sprayed over the whole trial on 18 DAT. Safari applied foliar at 2 and 4 oz per 100 gal appeared to provide some control at 7 DAT.

**Table 14. Efficacy on Twospotted Spider Mite (*Tetranychus urticae*) on Marigold (*Tagetes patula*) ‘Queen Sophia’, Davis, MI, 2005**

Treatment	Rate per 100 Gal	Number of Mites Per 3 Leaves		
		Pretreat 9/22	7 DAT 10/7	17 DAT 10/17
Aria 50SG (flonicamid)	60 g	6.50	16.00	67.00
Aria 50SG	120 g	0.50	26.67	97.33
Flagship 25WP (thiamethoxam)	2 oz	0.00	8.20	36.16
Flagship 25WP	4 oz	0.17	2.50	6.33
Orthene 97 (acephate)	1 lb	0.16	1.00	10.50
Safari 20SG (dinotefuran)	4 oz	0.16	0.33	9.00
Safari 20SG	8 oz	0.83	1.33	14.50
Safari 20SG - Drench	12 oz	0.7	11.00	78.67
Safari 20SG - Drench	24 oz	4.3	4.33	7.67
Talus 40SC (buprofezin)	18 fl oz	0.00	10.00	40.17
TriStar 30SG (acetamiprid)	112 g	0.00	1.83	14.50
TriStar 30SG	224 g	4.33	9.33	30.00
Untreated		4.0	10.83	37.33

\*B-1956 surfactant mixed with Flagship, Safari, TriStar and Orthene foliar applications. Treatments applied on 9/30, foliar treatments reapplied on 10/14.

**Davis 2008.** In 2008, Davis examined several products including BYI 08330, Meridian, Safari and Tristar for efficacy applied drench or foliar for efficacy on whiteflies, thrips and twospotted spider mites (*Tetranychus urticae*) on marigold (Table 15). BYI08330 was the only treatment that reduced mites significantly.

**Table 15\*. Efficacy on Twospotted Spider Mite (*Tetranychus urticae*) on Marigold (*Tagetes patula*) ‘Yellow Boy’, Davis, MI, 2008.**

Treatment	Rate Per 100 Gal	Applic. Method	Applic. Dates	Mite Population Rating <sup>x,y</sup>		
				10/14	10/21	11/4
BYI 08330 SC (spirotetramat)	0.38 fl oz	Drench	9/23	0.0 a	0.0 a	1.0 abc
BYI 08330 SC (spirotetramat)	0.64 fl oz	Drench	9/23	0.5 ab	0.0 a	0.5 a
BYI 08330 SC (spirotetramat)	0.96 fl oz	Drench	9/23	0.0 a	0.2 ab	0.5 a
BYI 08330 SC (spirotetramat)	1.28 fl oz	Drench	9/23	0.0 a	0.0 a	0.5 a
BYI 08330 SC (spirotetramat)	1.7 fl oz	Foliar	9/23, 10/7	0.3 ab	0.2 ab	0.3 a
BYI 08330 SC (spirotetramat)	2.5 fl oz	Foliar	9/23, 10/7	0.0 a	0.0 a	0.7 ab
Meridian 25WG (thiamethoxam)	1 oz	Foliar	9/23, 10/7	1.2 bc	0.7 abc	1.8 cd
Meridian 25WG (thiamethoxam)	2 oz	Foliar	9/23, 10/7	0.5 ab	0.8 bc	2.2 cd
Safari 20SG (dinotefuran)	2.84 oz	Drench	9/23	0.8 abc	0.7 abc	2.0 cd
TriStar 70WSP (acetamiprid)	2.3 oz	Foliar	9/23, 10/7	1.0 bc	0.5 ab	2.2 cd
Untreated	-	-	-	2.0 c	1.7 c	2.5 d

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 34: G35. Not all products tested included in table.

<sup>x</sup> Means followed by same letter do not differ significantly based on Fisher’s Protected LSD (P=0.05).

<sup>y</sup> Rating over a 5-leaf sample of 0-3 where 0 = no mites. A rating of 1 indicated that mites were present in one medium to large group on one leaflet or two small groups on different leaflets within the five leaf sample (1 - 15 individuals). A rating of 2 indicated two or three larger groups or three to five smaller groups of mites (16 – 35 individuals). A rating of 3 was indicative of many mites in numerous groups (36+ individuals).

**Wise 2006.** In 2006, Wise examined several miticides, including Acramite, Envidor and Proclaim for control of twospotted spider mites (*Tetranychus urticae*) on tart cherry. All treatments reduced mite infestation, with Acramite and Envidor maintaining populations below economic thresholds for the entire evaluation period; Proclaim provided inferior performance (Table 16).

**Price 2008.** In 2008, Price examined several miticides, including Agri-Mek, Acramite and BYI 08330 for control of twospotted spider mites (*Tetranychus urticae*) on strawberry. All treatments provided excellent reduction of mite motiles and eggs (Table 17). No phytotoxicity was observed in any treatment.

### **Southern Red Mite**

In 2007, Gilrein examined several miticides, including Shuttle, Floramite, Ovation and Sanmite for control of Southern red mites (*Oligonychus ilicis*) on holly. All treatments provided excellent reduction of mites (Table 18). No phytotoxicity was observed in any treatment.

### **Citrus Red Mite**

In 2007, Grafton-Cardwell examined several miticides, including Agri-Mek, Envidor, Kanemite and Movento for control of citrus red mite (*Panonychus citri*) on orange. All treatments significantly reduced citrus red mite densities for 8 weeks after treatment (Table 19). Movento and Envidor showed the greatest level of control of citrus red mite.

**Table 16. \* Efficacy on Twospotted Spider Mite (*Tetranychus urticae*) on Tart Cherry (*Prunus cerasus*), ‘Montmorency’ Wise, MI, 2006.**

Treatment	Rate Per Acre	Number of Motiles Per Leaf* (Henderson’s % Control)					
		Precount	7 DAT	13 DAT	20 DAT	27 DAT	34 DAT
Acramite 50WS (bifenazate) + Choice	16 oz + 3 qt/100 gal	216.71 a	12.07 d (92)	0.91 d (99)	2.72 d (95)	2.84 c (93)	1.28 d (96)
Envidor (spiroadiclofen)	16 fl oz	226.27 a	20.52 d (92)	2.51 d (98)	4.04 d (98)	2.35 c (97)	2.72 d (92)
Envidor + Sylgard	16 + 4 fl oz	205.26 a	35.06 cd (77)	7.70 d (92)	7.54 cd (90)	4.00 c (94)	3.38 d (81)
Proclaim 5SG (emamectin benzoate)	8 oz	260.05 a	98.63 b (60)	58.63 bc (68)	46.72 b (71)	39.47 b (69)	27.11 b (45)
Untreated	-	218.36 a	229.40 a (0)	149.56 a (0)	201.22 a (0)	162.90 a (0)	58.17 a (0)

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 32: B3. Not all products tested included in table.

x Means followed by same letter do not differ significantly based on Duncan’s New MRT (P=0.05).

**Table 17. \* Efficacy on Twospotted Spider Mite (*Tetranychus urticae*) on Strawberry (*Fragariae ananassa*), ‘Sweet Charlie’ Price, FL, 2008.**

Treatment <sup>y</sup>	Rate Per Acre	Number of Mites Per Leaf* (Henderson’s % Control)						
		1/15	1/22	1/29	2/6	2/12	2/19	2/26
<b>Number of Motiles Per Plant</b>								
Agri-Mek 0.15EC (abamectin)	16 fl oz	4.5 a	0.3 a (68)	2.0 a (0)	0.0 c (100)	0.3 c (96)	0.0 b (100)	0.8 b (99)
Acramite 50WS (bifenazate)	16 oz	14.3 a	1.3 a (56)	5.0 a (21)	1.0 c (96)	0.8 c (97)	0.3 b (95)	3.3 b (99)
BYI 08330 SC (spirotetramat) + NIS	5 fl oz	9.8 a	2.5 a (0)	0.5 a (89)	5.0 b (71)	5.8 b (65)	2.3 b (83)	2.3 b (99)
Untreated	-	6.3 a	1.3 a (0)	2.8 a (0)	11.0 a (0)	10.8 a (0)	8.5 a (0)	105.5 a (0)
<b>Number of Eggs Per Leaflet</b>								
Agri-Mek 0.15EC (abamectin)	16 fl oz	15.8 a	3.3 a (66)	2.3 b (89)	0.5 b (100)	0.5 b (99)	0.3 b (100)	0.0 b (100)
Acramite 50WS (bifenazate)	16 oz	21.3 a	15.5 a (0)	3.0 b (90)	6.5 b (96)	2.0 b (98)	2.0 b (98)	3.8 b (99)
BYI 08330 SC (spirotetramat) + NIS	5 fl oz	37.3 a	0.8 a (97)	0.0 b (100)	17.0 b (95)	26.0 a (83)	2.0 b (99)	5.3 b (100)
Untreated	-	7.8 a	4.8 a (0)	10.5 a (0)	65.5 a (0)	31.3 a (0)	32.8 a (0)	243.0 a (0)

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 34: C24. Not all products tested included in table.

x Means followed by same letter do not differ significantly based on Fisher’s Protected LSD (P=0.05).

<sup>y</sup> Acramite and BYI 08330 applied on 1/18 and 2/14, Agri-Mek applied on 1/18, 1/23, 2/14 and 2/21.

**Table 18. Efficacy on Southern Red Mite (*Oligonychus ilicis*) on Holly (*Ilex x meserveae*) ‘Blue Princess’, Gilrein, NY, 2007.**

Treatment	Rate per 100 Gal	Number of Mites		
		Pretreat 11/3	22 DAT 11/26	29 DAT 12/3
Floramite 2SC (bifenazate)	8 fl oz	48.9 a	0.0 b	0.3 b
Ovation SC (clofentezine)	8 fl oz	48.8 a	1.1 b	1.0 b
Sanmite 75WP (pyridaben)	4 oz	58.5 a	0.1 b	0.0 b
Shuttle 15SC (acequinocyl)	6.4 fl oz	65.1 a	0.1 b	0.1 b
Shuttle 15SC (acequinocyl)	12.8 fl oz	60.6 a	0.0 b	0.4 b
Untreated	-	53.9 a	107.5 a	113.1 a

<sup>x</sup> Means followed by same letter do not differ significantly (P=0.05, Fisher’s LSD).

**Table 19. \* Efficacy on Citrus Red Mite (*Panonychus citri*) on Orange (*Citrus sinensis*), ‘Fukumoto’ Grafton-Cardwell, CA, 2007.**

Treatment <sup>y</sup>	Rate Per Acre	Number of Female Mites Per Leaf <sup>x</sup> (Henderson’s % Control)								
		Pretreat	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT	7 WAT	8 WAT	9 WAT
Agri-Mek 0.15EC (abamectin)	10 fl oz	4.18 a	0.34 b (86)	1.05 b (74)	0.73 bc (88)	0.58 bc (90)	0.63 c (83)	0.14 cd (90)	0.14 cd (90)	0.16 b (4)
Envidor 240SC (spirodiclofen) + Induce	20 fl oz	4.21 a	0.10 cd (96)	0.20 cd (95)	0.31 ef (95)	0.14 e (98)	0.18 e (95)	0.05 d (96)	0.05 d (96)	0.06 c (64)
Kanemite 15SC (acequinocyl)	31 fl oz	4.18 a	0.13 cd (95)	0.25 cd (94)	0.40 c-f (93)	0.27 de (96)	0.46 cd (88)	0.09 cd (93)	0.09 cd (93)	0.08 c (52)
Movento 240SCSC (spirotetramat) + Induce	10 fl oz	4.19 a	0.07 d (97)	0.25 cd (94)	0.35 def (94)	0.22 de (96)	0.30 de (92)	0.06 d (96)	0.06 d (96)	0.06 c (63)
Untreated	-	4.28 a	2.55 a (0)	4.18 a (0)	6.03 a (0)	6.17 a (0)	3.78 a (0)	1.40 a (0)	1.40 a (0)	0.17 ab (0)

\* Not an IR-4 Experiment: Arthropod Management Tests Vol 33: D5. Not all products tested included in table.

<sup>x</sup> Means followed by same letter do not differ significantly based on LSD (P=0.05).

### Comparative Efficacy on Red Palm Mite

The red palm mite (family *Tenuipalpidae*), is widespread in the tropical and subtropical regions throughout the Eastern Hemisphere. It was first reported in the Western Hemisphere in 2004 in the Caribbean island Martinique and in the U.S. in Palm Beach County on December, 2007. Since then it has been reported in Broward, Miami-Dade, Monroe and other counties. It is a significant threat to all ornamental palms, coconut, and banana. The mite thrives on the underside of leaves and fronds and in high numbers, causes localized leaf yellowing followed by death of plant tissue.

In 2008, Pena conducted two experiments in Florida, and Rodriguez one trial in Puerto Rico, to examine efficacy of several products including Avid/Agrimek, Forbid/Judo, Hexygon, Ovation, Pylon, Sanmite, Shuttle, Sulfur/Thiolux, Tetrasan and Ultiflora on red palm mite (*Raoiella indica*) on coconut palm. In the first Florida trial, Avid and Tetrasan significantly reduced mite infestation, though less effective than Sulfur (Table 20). In the second trial, Agrimek treatments, Sanmite and Thiolux significantly reduced infestation up to 56 DAT; the other products had less residual activity (Table 20). Results of the Puerto Rico trial showed Forbid and Judo providing excellent control, while Hexygon, Ovation and Tetrasan were less effective, and Avid was ineffective (Table 22). No phytotoxicity was observed in any treatment.

**Table 20. Efficacy on red palm mite (*Raoiella indica*) on coconut palm (*Cocos* sp.), Pena, FL, 2008. Test 1.**

Treatment	Rate Per 100 Gal	Number of Mites Per 20 Lens Fields <sup>x</sup> (Henderson's % Control)						
		0 DAT	8 DAT	14 DAT	21 DAT	28 DAT	33 DAT	42 DAT
Avid 0.15EC (abamectin)	4 fl oz	17.45 b	15.35 c (23)	20.20 bc (22)	69.35 a (0)	66.50 a (0)	115.00 ab (0)	46.65 ab (0)
Sulfur 6L (sulfur)	2.5 gal	17.6 b	1.65 c (92)	14.65 c (44)	21.40 c (16)	15.95 b (58)	25.95 c (0)	16.35 b (4)
Tetrasan 5WDG (etoxazole)	16 oz	14.7 b	10.35 c (38)	27.90 abc (0)	29.60 bc (0)	7.40 b (77)	40.90 c (0)	27.45 ab (0)
Untreated	-	34.85 a	39.70 ab (0)	51.60 a (0)	50.35 abc (0)	75.80 a (0)	51.40 c (0)	33.75 ab (0)

<sup>x</sup> Means followed by same letter do not differ significantly (P=0.05, LSD). Not all treatments included in table.

**Table 21. Efficacy on red palm mite (*Raoiella indica*) on coconut palm (*Cocos* sp.), Pena, FL, 2008. Test 2.**

Treatment	Rate Per 100 Gal	Number of Mites Per 20 Lens Fields <sup>x</sup> (Henderson's % Control)						
		0 DAT	7 DAT	13 DAT	21 DAT	27 DAT	42 DAT	56 DAT
Agrimek0.15EC (abamectin)	8 fl oz	45.35 a	9.35 bc (78)	11.90 cd (83)	10.35 cd (62)	16.55 cd (64)	20.80 cd (72)	14.90 de (53)
Agrimek 0.15EC +Oil	8 fl oz + 1 %	91.65 a	6.50 bc (92)	9.45 cd (93)	5.50 cd (90)	7.05 d (92)	7.20 d (95)	10.35 e (84)
Agrimek 0.15EC +Silwet	8 fl oz +4 fl oz	70.95 a	4.35 c (93)	21.20 cd (81)	0.20 d (100)	0.10 d (100)	2.05 d (98)	0.05 e (100)
Pylon (chlorfenaphyr)	5.2 fl oz	122.8 a	10.00 bc (91)	40.40bc (79)	13.50 cd (82)	43.70 c (65)	74.75 abc (63)	74.75 abc (14)
Sanmite (pyridaben)	6 oz	49.95 a	5.75 bc (88)	0.90 d (99)	2.90 d (90)	4.15 d (92)	8.50 d (90)	26.45 cde (25)
Shuttle 15SC (acequinocyl)	12.8 fl oz	118.6 a	3.15 c (97)	12.80cd (93)	15.05 cd (79)	22.95 cd (45)	35.15 cd (82)	61.80 bcd (26)
Tetrasan 5WDG (etoxazole)	16 oz	35.30 a	16.15 bc (51)	25.75 cd (53)	32.10 bc (0)	28.05 cd (21)	76.70 bc (0)	65.35 bc (0)
Thiolux (sulfur)	10 lb	65.35 a	10.35 bc (83)	7.50 cd (93)	21.85 cd (44)	45.15 c (32)	27.30 cd (75)	36.60 cde (21)
Ultiflora (milbemectin)	16 fl oz	65.00 a	28.10 b (56)	74.65 b (36)	53.15 b (0)	78.50 b (0)	99.85 b (8)	123.55 a (0)
Untreated	-	143.3 a	134.00 a (0)	222.70 a (0)	85.20 a (0)	144.95 a (0)	238.50 a (0)	101.25 ab (0)

<sup>x</sup> Means followed by same letter do not differ significantly (P=0.05, LSD).

\* All treatments applied 9/11; Agrimek treatments reapplied 14 days later.

**Table 22. Efficacy on red palm mite (*Raoiella indica*) on coconut palm (*Cocos* sp.), Rodriguez, PR, 2008.**

Treatment	Rate Per 100 Gal	Number of Mites Per 20 Lens Fields <sup>x</sup> (% Control) at 14 DAT
Avid 0.15EC (abamectin)	4 fl oz	32.73 ab (41)
Forbid 480SC(spiromesifen)	2 fl oz	1.02 c (98)
Hexygon DF (hexythiazox)	2 oz	16.82 b (70)
Judo (spiromesifen)	2 fl oz	0.00 c (100)
Ovation SC(clofentezine)	2 fl oz	13.64 b (75)
Tetrasan 5 WDG (etoxazole)	10 oz	20.91 b (62)
Untreated	-	55.23 a (0)

<sup>x</sup> Means followed by same letter do not differ significantly (P=0.05, Tukey's HSD).

## ***Efficacy Summary by Active Ingredient***

**Abamectin.** Avid provided excellent efficacy on broad mite in a New Guinea impatiens and 3 bell pepper trials. Avid® + 1% SuffOil X provided good initial, but short residual, activity on the Eriophyid *Aceria* sp. in a New Mexico olive test. It provided excellent efficacy on hedge privet rust mites in a variegated privet trial. Mixed efficacy on red palm mite was obtained in three coconut palm trials. Agri-Mek significantly reduced tomato russet mite infestations in two tomato trials. It provided excellent efficacy on twospotted spider mite in a strawberry trial and good efficacy on citrus red mite in an orange trial.

**Acequinocyl.** Shuttle provided excellent efficacy on Southern red mite in a holly trial, and good efficacy on red palm mite in a coconut palm trial, and on citrus red mite in an orange trial. Kanemite significantly reduced tomato russet mite infestations in two tomato trials, comparable to Agri-Mek.

**Chlorfenapyr.** Pylon alone or in tank-mix combination with Ultra-Pure Oil or Suffoil X provided excellent efficacy on broad mite in a New Guinea impatiens trial. Also it provided excellent efficacy on hedge privet rust mite in a variegated privet trial, good efficacy on red palm mite in a coconut palm trial and excellent efficacy on twospotted spider mite in a marigold trial.

**Chromobacterium subsugae NRRL B-30655.** MBI 203 provided poor efficacy on broad mite in a New Guinea impatiens trial

**Clofentezine.** Ovation provided excellent efficacy on Southern red mite in a holly trial, but mediocre efficacy on red palm mite in a coconut palm trial.

**Emamectin Benzoate.** Proclaim provided excellent efficacy on broad mite in a New Guinea impatiens trial but poor efficacy in a bell pepper trial. It generally provided efficacy on the Eriophyid *Aceria* sp. in a New Mexico olive test that was comparable to the standard Avid® + 1% SuffOil X. It provided excellent efficacy, though slower-acting, on hedge privet rust mites in a variegated privet trial. Efficacy on twospotted spider mite was mediocre in a tart cherry trial.

**Etoxazole.** Tetrasan provided poor to mediocre efficacy on red palm mite in three coconut palm trials.

**Fenazaquin.** Magus provided good efficacy on broad mite in a New Guinea impatiens trial. It generally provided efficacy on the Eriophyid *Aceria* sp. in a New Mexico olive test that was comparable to the standard Avid® + 1% SuffOil X. It provided excellent efficacy on hedge privet rust mites in a variegated privet trial.

**Fenpyroximate.** Akari provided mediocre activity on the Eriophyid *Aceria* sp. in a New Mexico olive test. It provided excellent, though slow-acting, efficacy on hedge privet rust mites in a variegated privet trial, and good efficacy on twospotted spider mite in a marigold trial. Fujimite significantly reduced apple rust mite infestation in an apple trial and tomato russet mite infestations in two tomato trials.

**Hexythiazox.** Hexygon was ineffective on the Eriophyid *Aceria* sp. in a New Mexico olive test and on hedge privet rust mites in a variegated privet trial. It provided mediocre efficacy on red palm mite in a coconut palm trial.

**Metarhizium anisopliae.** Tick Ex provided excellent, though slower-acting, efficacy on hedge privet rust mites in a variegated privet trial.

**Milbemectin.** Mesa provided excellent efficacy on broad mite in two bell pepper trials. Ultiflora provided mediocre activity on the Eriophyid *Aceria* sp. in a New Mexico olive test, and poor efficacy on red palm mite in a coconut palm trial. It provided excellent efficacy on hedge privet rust mites in a variegated privet trial. Mesa significantly reduced apple rust mite infestation in an apple trial. It provided good efficacy on pear rust mites in a pear trial but it has less residual activity than Agri-Mek. It significantly reduced tomato russet mite infestations in two tomato trials, comparable to Agri-Mek.



**Petroleum Oil.** SuffOil X provided good efficacy on broad mite in a New Guinea impatiens trial.

**Pyridaben.** Sanmite provided excellent efficacy on Southern red mite in a holly trial, and good efficacy on red palm mite in a coconut palm trial, and on twospotted spider mite in a marigold trial. Efficacy on apple rust mite was poor in an apple trial.

**Spiromesifen.** Forbid and Judo provided excellent efficacy on red palm mite in a coconut palm trial. Oberon provided excellent efficacy on broad mite in a bell pepper trial. It significantly reduced tomato russet mite infestations in two tomato trials, comparable to Agri-Mek.

**Spirotetramat.** Kontos applied as drench or foliar treatment generally provided mediocre activity on broad mite in a New Guinea impatiens trial. It generally provided efficacy on the Eriophyid *Aceria* sp. in a New Mexico olive test that was comparable to the standard Avid® + 1% SuffOil X. It provided excellent efficacy on hedge privet rust mites in a variegated privet trial. BYI 08330 provided good efficacy on twospotted spider mite in a marigold trial, and excellent efficacy in a strawberry trial. Movento provided excellent efficacy on citrus red mite in an orange trial.

**Sulfur.** Sulfur and Thiolux provided good efficacy on red palm mite in two coconut palm trials.

**Tank-Mix:Chlorfenapyr + Horticultural Oil.** Pylon + Ultra-Pure Oil provided excellent efficacy on broad mite in a New Guinea impatiens trial.

**Tank-Mix:Chlorfenapyr + Petroleum Oil.** Pylon + SuffOil X provided excellent efficacy on broad mite in a New Guinea impatiens trial.

Please see Table 23 for a list of all researchable studies and the summary of trials conducted from 2004 to 2011.

### ***Phytotoxicity***

No phytotoxicity was observed in any crop with the exception of New Guinea impatiens where the Pylon + Ultra-Pure oil combination showed severe leaf burn and bud injury after the second application; Pylon + Suffoil X also showed slight leaf burn, primarily at the leaf tips.

**Table 23. Summary of product efficacy by pest and crop.**

Note: Table entries are sorted by product, pathogen Latin name, and then by crop Latin name. Only those IR-4 trials received by 3/05/2012 are included in the table below.

PR #	Product (Active ingredient)	Target	Crop	Production Site	Researcher	Year	Application Type	Results	File Name
30186	Akari 5SC (Fenpyroximate)	Eriophyid Mite, Forestiera (Aceria sp.)	New Mexican Privet (Forestiera neomexicana)	Field Container	Grasswitz	2011	Spray to runoff	Significant control with 24 fl oz per 100 gal applied twice; comparable to, though slower-acting than, Avid + 1 % oil applied twice.	20111202a.pdf
29780	Akari 5SC (Fenpyroximate)	Hedge privet rust mite (Aculus ligustri)	Privet, Variegated (Ligustrum sinense) Varigatum	Greenhouse	Uber	2010	Spray-to-wet	Excellent control after 2nd application at 24 fl oz per 100 gal.	20101104h.pdf
29787	Avid 0.15EC (Abamectin)	Hedge privet rust mite (Aculus ligustri)	Privet, Variegated (Ligustrum sinense) Varigatum	Greenhouse	Uber	2010	Spray-to-wet	Excellent control at 4 fl oz per 100 gal + 415 Narrow Range Oil.	20101104h.pdf
29563	Avid 0.15EC (Abamectin)	Broad Mite (Polyphagotarsonemus latus)	New Guinea Impatiens (Impatiens New Guinea hybrids) I. hawkeri 'Celebrette Purple'	Greenhouse	Gilrein	2010	Foliar	Excellent control at 8 fl oz per 100 gal; no injury or growth reduction.	20110125a.pdf
27892	Avid 0.15EC (Abamectin)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008	Foliar	Test 1; Avid used: Significant reduction of red palm mite population up to 14 DAT with 4 oz per 100 gal.	20110911a.pdf
27892	Avid 0.15EC (Abamectin)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008	Foliar	Test 2; AgriMek (Food Trade Name) used: Good to excellent control of red palm mite with 8 oz per 100 gal w/ or w/o surfactant.	20110911a.pdf
27892	Avid 0.15EC (Abamectin)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Rodriquez	2008	Foliar	Did not significantly reduce red palm mite population with 4 oz per 100 gal.	20110911b.pdf
30391	Emamectin Benzoate (Emamectin benzoate)	Eriophyid Mite, Forestiera (Aceria sp.)	New Mexican Privet (Forestiera neomexicana)	Field Container	Grasswitz	2011	Spray to runoff	Significant control with 4 and 8 fl oz per 100 gal applied twice; comparable to, though slower-acting than, Avid + 1 % oil applied twice.	20111202a.pdf

30187	Hexygon (Hexythiazox)	Eriophyid Mite, Forestiera (Aceria sp.)	New Mexican Privet (Forestiera neomexicana)	Field Container	Grasswitz	2011	Spray to runoff	No control with 2 oz per 100 gal applied once.	20111202a.pdf
29781	Hexygon (Hexythiazox)	Hedge privet rust mite (Aculus ligustri)	Privet, Variegated (Ligustrum sinense) Varigatum	Greenhouse	Uber	2010	Spray-to- wet	Poor control at 2 oz per 100 gal.	20101104h.pdf
27952	Hexygon (Hexythiazox)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008	Foliar	Product not included in trial.	20110911a.pdf
27952	Hexygon (Hexythiazox)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Rodriquez	2008	Foliar	No significant reduction of red palm mite population at 14 DAT with 2 oz per 100 gal.	20110911b.pdf
27562	Judo 2SC (Spiromesifen)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008		Product not included in trial.	20110911a.pdf
27562	Judo 2SC (Spiromesifen)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Rodriquez	2008	Foliar	Excellent control of red palm mite population with 2 oz per 100 gal; best treatment.	20110911b.pdf
30188	Kontos (BYI 8330 240SC) (Spirotetramat)	Eriophyid Mite, Forestiera (Aceria sp.)	New Mexican Privet (Forestiera neomexicana)	Field Container	Grasswitz	2011	Spray to runoff	Significant control with 3.4 fl oz per 100 gal applied twice; comparable to, though slower- acting than, Avid + 1 % oil applied twice.	20111202a.pdf
29782	Kontos (BYI 8330 240SC) (Spirotetramat)	Hedge privet rust mite (Aculus ligustri)	Privet, Variegated (Ligustrum sinense) Varigatum	Greenhouse	Uber	2010	Spray-to- wet	Excellent control after 2nd application at 3.4 fl oz per 100 gal.	20101104h.pdf
29558	Kontos (BYI 8330 240SC) (Spirotetramat)	Broad Mite (Polyphagotarsonemus latus)	New Guinea Impatiens (Impatiens New Guinea hybrids) I. hawkeri 'Celebrette Purple'	Greenhouse	Gilrein	2010	Drench	Fair control at 50 ml per 1100 pots; inferior to Avid; no injury or growth reduction.	20110125a.pdf
29558	Kontos (BYI 8330 240SC) (Spirotetramat)	Broad Mite (Polyphagotarsonemus latus)	New Guinea Impatiens (Impatiens New Guinea hybrids) I. hawkeri 'Celebrette Purple'	Greenhouse	Gilrein	2010	Foliar	Fair control at 3.4 fl oz per 100 gal; inferior to Avid; no injury or growth reduction.	20110125a.pdf
28933	Kontos (BYI 8330 240SC) (Spirotetramat)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Rodriquez	2008	Foliar	Product not included in trial.	20110911b.pdf

30189	Magus (Fenazaquin)	Eriophyid Mite, Forestiera ( <i>Aceria</i> sp.)	New Mexican Privet ( <i>Forestiera neomexicana</i> )	Field Container	Grasswitz	2011	Spray to runoff	Significant control with 24 fl oz per 100 gal applied once; comparable to Avid + 1 % oil applied twice.	20111202a.pdf
30068	Magus (Fenazaquin)	Hedge privet rust mite ( <i>Aculus ligustri</i> )	Privet, Variegated ( <i>Ligustrum sinense</i> ) <i>Varigatum</i>	Greenhouse	Uber	2010	Spray-to-wet	Excellent control after 2nd application at 24 fl oz per 100 gal.	20101104h.pdf
29557	Magus (Fenazaquin)	Broad Mite ( <i>Polyphagotarsonemus latus</i> )	New Guinea Impatiens ( <i>Impatiens</i> New Guinea hybrids) I. hawkeri 'Celebrette Purple'	Greenhouse	Gilrein	2010	Foliar	Good control but short residual activity at 12 and 24 fl oz per 100 gal; inferior to Avid; no injury or growth reduction.	20110125a.pdf
29559	MBI 203 DF ( <i>Chromobacterium subtsugae</i> NRRL B-30655)	Broad Mite ( <i>Polyphagotarsonemus latus</i> )	New Guinea Impatiens ( <i>Impatiens</i> New Guinea hybrids) I. hawkeri 'Celebrette Purple'	Greenhouse	Gilrein	2010	Foliar	No efficacy at 1 % and 5 % conc.; no injury or growth reduction.	20110125a.pdf
27765	Ovation SC (Clofentezine)	Mite, Southern red ( <i>Oligonychus ilicis</i> )	Holly ( <i>Ilex</i> sp.) 'Blue Princess'	Greenhouse	Gilrein	2007	Foliar	Excellent control with 8 fl oz per 100 gal; comparable to Floramite and Sanmite.	20080117b.pdf
27893	Ovation SC (Clofentezine)	Red Palm Mite ( <i>Raoiella indica</i> )	Palm, Coconut ( <i>Cocos</i> sp.)	Field Container	Rodriquez	2008	Foliar	Significantly reduced red palm mite population at 14 DAT with 2 oz per 100 gal; better than Avid.	20110911b.pdf
29785	Proclaim 5SG (Emamectin benzoate)	Hedge privet rust mite ( <i>Aculus ligustri</i> )	Privet, Variegated ( <i>Ligustrum sinense</i> ) <i>Varigatum</i>	Greenhouse	Uber	2010	Spray-to-wet	Excellent control after 2nd application at 4 and 8 oz per 100 gal.	20101104h.pdf
29800	Proclaim 5SG (Emamectin benzoate)	Broad Mite ( <i>Polyphagotarsonemus latus</i> )	New Guinea Impatiens ( <i>Impatiens</i> New Guinea hybrids) I. hawkeri 'Celebrette Purple'	Greenhouse	Gilrein	2010	Foliar	Excellent control at 4 and 8 oz per 100 gal; equal to Avid; no injury or growth reduction.	20110125a.pdf
29783	Pylon (Chlorfenapyr)	Hedge privet rust mite ( <i>Aculus ligustri</i> )	Privet, Variegated ( <i>Ligustrum sinense</i> ) <i>Varigatum</i>	Greenhouse	Uber	2010	Spray-to-wet	Excellent control after 2nd application at 2.6 fl oz per 100 gal.	20101104h.pdf

29560	Pylon (Chlorfenapyr)	Broad Mite (Polyphagotarsonemus latus)	New Guinea Impatiens (Impatiens New Guinea hybrids) I. hawkeri 'Celebrette Purple'	Greenhouse	Gilrein	2010	Foliar	Excellent control at 5.6 fl oz per 100 gal; equal to Avid; no injury or growth reduction.	20110125a.pdf
27561	Pylon (Chlorfenapyr)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008	Foliar	Good control of red palm mite with 5.2 fl oz per 100 gal.	20110911a.pdf
27766	Sanmite (BASF) (Pyridaben)	Mite, Southern red (Oligonychus ilicis)	Holly (Ilex sp.) 'Blue Princess'	Greenhouse	Gilrein	2007	Foliar	Excellent control with 4 oz per 100 gal.	
27953	Sanmite (BASF) (Pyridaben)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008	Foliar	Excellent control of red palm mite with 6 oz per 100 gal; best treatment.	20110911a.pdf
27764	Shuttle 15SC (Acequinocyl)	Mite, Southern red (Oligonychus ilicis)	Holly (Ilex sp.) 'Blue Princess'	Greenhouse	Gilrein	2007	Foliar	Excellent control with 6.4 and 12.8 fl oz per 100 gal; comparable to Floramite and Sanmite.	20080117b.pdf
27557	Shuttle 15SC (Acequinocyl)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008	Foliar	Good control of red palm mite with 12.8 oz per 100 gal.	20110911a.pdf
29905	SuffOil X (Synergy) (Petroleum Oil)	Broad Mite (Polyphagotarsonemus latus)	New Guinea Impatiens (Impatiens New Guinea hybrids) I. hawkeri 'Celebrette Purple'	Greenhouse	Gilrein	2010	Foliar	Good control but short residual activity at 1 % conc.; inferior to Avid; no injury or growth reduction.	20110125a.pdf
29561	Tank Mix: Pylon + Horticultural Oil (Chlorfenapyr + horticultural oil)	Broad Mite (Polyphagotarsonemus latus)	New Guinea Impatiens (Impatiens New Guinea hybrids) I. hawkeri 'Celebrette Purple'	Greenhouse	Gilrein	2010	Foliar	Excellent control at 5.6 fl oz per 100 gal + 1 % Ultra-Pure Oil; equal to Avid; severe leaf burn and bud injury.	20110125a.pdf
29562	Tank Mix: Pylon + SuffOil X (Chlorfenapyr +)	Broad Mite (Polyphagotarsonemus latus)	New Guinea Impatiens (Impatiens New Guinea hybrids) I. hawkeri 'Celebrette Purple'	Greenhouse	Gilrein	2010	Foliar	Excellent control at 5.6 fl oz per 100 gal + 1 % Suffoil-X; equal to Avid; slight leaf injury.	20110125a.pdf
27559	Tetrasan (Etoxazole)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008	Foliar	Test 1: Significant reduction of red palm mite population up to 14 DAT with 16 oz per 100 gal.	20110911a.pdf
27559	Tetrasan (Etoxazole)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008	Foliar	Test 2: Good control of red palm mite with 16 oz per 100 gal.	20110911a.pdf

27559	Tetrasan (Etoxazole)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Rodriquez	2008	Foliar	No significant reduction of red palm mite population at 14 DAT with 10 oz per 100 gal.	20110911b.pdf
27950	Thiolux 80DF (Sulfur)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008	Foliar	Good control of red palm mite with 10 lb per 100 gal.	20110911a.pdf
29786	TickEx EC (Metarhizium anisopliae)	Hedge privet rust mite (Aculus ligustri)	Privet, Variegated (Ligustrum sinense) Varigatum	Greenhouse	Uber	2010	Spray-to-wet	Good to excellent control after 2nd application at 29 fl oz per 100 gal.	20101104h.pdf
30190	Ultiflora (Milbemectin)	Eriophyid Mite, Forestiera (Aceria sp.)	New Mexican Privet (Forestiera neomexicana)	Field Container	Grasswitz	2011	Spray to runoff	Poor to no control with 16 fl oz per 100 gal applied twice.	20111202a.pdf
29784	Ultiflora (Milbemectin)	Hedge privet rust mite (Aculus ligustri)	Privet, Variegated (Ligustrum sinense) Varigatum	Greenhouse	Uber	2010	Spray-to-wet	Excellent control at 16 fl oz per 100 gal; judged the best treatment.	20101104h.pdf
27560	Ultiflora (Milbemectin)	Red Palm Mite (Raoiella indica)	Palm, Coconut (Cocos sp.)	Field Container	Pena	2008	Foliar	Mediocre control of red palm mite with 16 oz per 100 gal.	20110911a.pdf

## Appendix 1: Contributing Researchers

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## **Appendix 2: Submitted Data**

Researcher reports included in the printed copy of this report are those received by 5/1/2012. These reports can also be found at [www.rutgers.ir4.edu](http://www.rutgers.ir4.edu) by searching under the Mite and Eriophyd Mite efficacy projects.