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IR-4 Ornamental Horticulture Program
Aphid Efficacy: A Literature Review

Acyrthosiphon lactucae
Acyrthosiphon pisum
Aphis craccivora
Aphis gossypii
Aphis spiraecola
Aulacorthum solani
Dysaphis plantaginea
Eriosoma lanigerum
Lipaphis spp.
Macrosiphum euphorbiae
Myzus persicae
Nasanovia ribisnigri
Tinocallis kahawaluokalani

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Abstract

In the past, IR-4 had conducted Ornamental Horticulture Surveys to poll growers, landscape care operators, researchers, extension personnel and others affiliated with the ornamental industry on needs and issues related to disease, insect, and weed management. In 2013, aphids were identified as one of the top five important insects of concern. This summary includes a review of experiments conducted from 1998 to 2013 on ornamental horticulture and food crops published in Arthropod Management Tests. During this time period, numerous products representing 35 active ingredients were tested as foliar or soil applications against several species of aphids known to attack ornamental crops. Although there were insufficient data for definitive conclusions, many of the older registered active ingredients, including, acephate, acetamiprid, bifenthrin, chlorpyrifos, dimethoate, flonicamid, imidacloprid, lambda-chyalothrin, malathion, pymetrozine, spirotetramat, and thiamethoxam generally provided effective control. Similarly, several relatively new products, including cyantraniliprole, pyrifluquinazon, sulfoxaflor, and tolfenpyrad were effective.

Introduction

In the past, IR-4 had conducted Ornamental Horticulture Surveys to poll growers, landscape care operators, researchers, extension personnel and others affiliated with the ornamental industry on needs and issues related to disease, insect, and weed management. In 2013, aphids were identified as one of the top five important insects of concern. We reviewed 6 available ornamental and 72 food crops trials published in Arthropod Management Tests to check efficacy of experimental and registered fungicides on various aphid species that are known to attack ornamentals; the source of report is included under each data table. This report is a brief summary of available data from these sources.

Materials and Methods

From 1998 to 2013, numerous products representing 35 active ingredients were tested as foliar or soil applications against several aphid species known to attack ornamentals (Table 1 and Table 2). Aphids tested included *Acyrthosipon lactucae*, pea aphids (*Acyrthosiphon pisum*), cowpea aphids (*Aphis craccivora)*, cotton/melon aphids (*Aphis gossypii)*, spirea aphids (*Aphis spiraecola*), foxglove aphids (*Aulacorthum solani*), rosy apple aphids (*Dysaphis plantaginea*), wooly apple aphids (*Eriosoma lanigerum*), turnip aphids (*Lipaphis* spp.), potato aphids (*Macrosiphum euphorbia*), green peach aphids (*Myzus persicae*), lettuce aphids (*Nasanovia ribisnigri*), and crapemyrtle aphids (*Tinocallis kahawaluokalani*). Trials on ornamentals were conducted in the greenhouse, while food crop trials were in the field, generally against natural aphid infestations. Researchers used a minimum of four replications. Insect infestations were recorded at various intervals after initial application. Phytotoxicity or lack of it was generally noted in the reports. Twenty four researchers were involved in the testing (Appendix 1).

Table 1. List of Products and Rates Tested on Ornamental Horticulture Crops from 1998 to 2010.

Active Ingredient(s)	Product	Manufacturer	Application Method & Rates		# Trials
Abamectin	Avid 0.15EC	Syngenta	Foliar	8.0 fl oz per 100 gal	1
				15.5 fl oz per 100 gal	1
Acephate	Orthene 75S	Arysta	Foliar	0.65 lb per 100 gal	1
	Orthene 97	Amvac	Foliar	0.5 lb per 100 gal	1
				1.13 g per gal	1
Acetamiprid	Tristar 30SG	Cleary	Foliar	1.3 oz per 100 gal	2
				2.7 oz per 100 gal	1
Azadirachtin	Azatin XL	OHP	Foliar	5.0 fl oz per 100 gal	1
				4.72 ml per gal	1
Beauvaria bassiana	Botanigard 22WP	Bioworks	Foliar	1.0 lb per 100 gal	1
Beauvaria bassiana	Botanigard ES	Bioworks	Foliar	1.0 pt per 100 gal	1
				1.0 qt per 100 gal	1
Bifenthrin	Talstar Pro	FMC	Foliar	12.0 fl oz per 100 gal	1
				23.9 fl oz per 100 gal	1
Dinotefuran	Safari 20 SG	Valent	Foliar	8.0 oz per 100 gal	1
			Drench	24.0 oz per 100 gal	1
			Soil	1.7 oz/1000 pots	1
	V-10112 20SG	Valent	Foliar	4.0 oz per 100 gal	1
				5.0 oz per 100 gal	1
				8.0 oz per 100 gal	2
				10.0 oz per 100 gal	1
			Drench	0.22 g per pot	1
				0.43 g per pot	1
Flonicamid	F1785 50WG	FMC	Foliar	0.71 oz per 100 gal	1
				1.41 oz per 100 gal	1
				2.82 oz per 100 gal	1
	Flonicamid 50DF	FMC	Foliar	2.82 oz per 100 gal	1
				5.64 oz per 100 gal	1
Imidacloprid	Marathon II	OHP	Foliar	1.7 fl oz per 100 gal	2
			Drench	0.025 ml per pot	1
	Merit 2F	Bayer	Soil	24 fl oz/1000 pots	1
Malathion	Hi-Yield Malathion 55%	Hi-Yield Chem	Foliar	1.5 tsp per gal	1
Methiocarb	Mesurol	Gowan	Foliar	1.0 lb per 100 gal	1
Petroleum Oil	Ortho Volck Oil	Scotts	Foliar	2.5 fl oz per gal	1
Potassium Salts of Fatty Acids	Safer Insect Killing Soap	Safer	Foliar	2.5 fl oz per gal	1
Pymetrozine	Endeavor 50WG	Syngenta	Foliar	5.0 oz per 100 gal	1
Pyrethrins	Bonide Pyrethrins	Bonide	Foliar	1.0 tsp per gal	1
Rosemary & Peppermint Oils	Ecotrol EC	Ecosmart	Foliar	40 fl oz per 100 gal	1
Thiamethoxam	Flagship 25 WG	Syngenta	Foliar	4.0 oz per 100 gal	1
			Drench	4.0 oz per 100 gal	2

Table 2. List of Products and Rates Tested on Food Crops from 1999 to 2013.

Active Ingredient(s)	Product	Manufacturer	Application Method & Rates		# Trials
Acephate	Acephate 97UP	UPI	Foliar	1 lb per acre	1
Acetamiprid	Assail 30SG	UPI	Foliar	1.7 oz per acre	3
				2.5 oz per acre	2
				3.0 oz per acre	1
				3.4 oz per acre	1
				4.0 oz per acre	10
				5.3 oz per acre	3
				6.0 oz per acre	1
				0.09 and 0.13 lb ai per acre	1
				0.11 lb ai per acre	1
	Assail 70WP			0.9 oz per acre	1
				1.1 oz per acre	1
				1.7 oz per acre	5
				3.4 oz per acre	1
				4.7 oz per acre	1
	Assail TD 2480-01			0.025 lb ai per acre	1
				0.05 lb ai per acre	1
Azadirachtin	Aza-Direct	Gowan	Foliar	12 fl oz per acre	1
				16 fl oz per acre	2
				20 fl oz per acre	1
				24 fl oz per acre	2
				32 fl oz per acre	3
	Neemix 4.5	Certis	Foliar	16 fl oz per acre	1
Bifenthrin	Capture 2EC	FMC	Foliar	0.04 lb ai per acre	1
	Discipline 2EC	Amvac	Foliar	6.4 fl oz per acre	1
Burkholderia sp. strain A396	MBI-206	Marrone	Foliar	1 gal per acre	1
				2 gal per acre	1
Chenopodium ambrosioides extract	Requiem EC	Bayer	Foliar	4 qt per acre	1
Chlorantraniliprole	Altacor WDG	DuPont	Foliar	3.0 oz per acre	1
	Coragen		Foliar	3.5 fl oz per acre	1
				5.0 fl oz per acre	1
Chlorpyrifos	Lorsban 75WG	Dow	Foliar	1 lb per acre	1
	Lorsban Advanced			32 fl oz per acre	2
Chromobacterium subtsugae	MBI 203 30DF	Marrone	Foliar	1 lb per acre	1
				2 lb per acre	2
				3 lb per acre	1
Cyantraniliprole	Cyazypyr 10SC	DuPont	Foliar	14.0 fl oz per acre	1
	Cyazypyr 20SC		Soil	10.4 fl oz per acre	1
	Exirel 10 SE		Foliar	13.5 fl oz per acre	1
				17.0 fl oz per acre	1
				20.0 fl oz per acre	1

Active Ingredient(s)	Product	Manufacturer	Application Method & Rates		# Trials
Cyantraniliprole, continued	HGW86	DuPont	Foliar	6.8 fl oz per acre	3
				10.1 fl oz per acre	5
				13.5 fl oz per acre	7
				16.9 fl oz per acre	3
				20.5 fl oz per acre	4
			Soil	5.1 fl oz per acre	1
				6.8 fl oz per acre	1
				10.3 fl oz per acre	3
				13.5 fl oz per acre	1
Diazinon	Diazinon	Makteshim	Foliar	2 lb per acre	3
				4 lb per acre	4
Dimethoate	Dimethoate 4EC	Several companies	Foliar	0.50 lb ai per acre	1
				8 fl oz per acre	1
	Dimethoate 2.67EC			16 fl oz per acre	4
Dinotefuran	Dinotefuran 20SG	Valent	Foliar	4.0 oz per acre	1
				5.3 oz per acre	2
				7.0 oz per acre	3
				8.0 oz per acre	1
			Soil	1.1 lb per acre	2
	Scorpion 35SL	Gowan	Foliar	7.5 fl oz per acre	1
	Venom 20SG	Valent	Foliar	7.0 oz per acre	1
				10.6 oz per acre	1
Flonicamid	Beleaf 50SG	FMC	Foliar	2.0 oz per acre	1
				2.3 oz per acre	6
				2.8 oz per acre	6
				0.09 lb ai per acre	1
	F-1785 50WP			1.1 oz per acre	2
				1.4 oz per acre	2
	Flonicamid 50DF			2.3 oz per acre	5
				2.8 oz per acre	1
				8.0 oz per acre	2
	V-10170 50WDG			1.0 oz per acre	1
				1.4 oz per acre	1
				1.8 oz per acre	1
Flupyradiflurone	Sivanto SC	Bayer	Foliar	7.0 fl oz per acre	1
				7.5 fl oz per acre	1
				10.0 fl oz per acre	1
				10.5 fl oz per acre	1
				14.0 fl oz per acre	1
Imidacloprid	Admire 2F	Bayer	Soil	9.5 fl oz per acre	1
				12.5 fl oz per acre	1
				16.0 fl oz per acre	3
				18.0 fl oz per acre	1
				20.0 fl oz per acre	1
	Admire Pro			3.6 fl oz per acre	1
				10.5 fl oz per acre	1
				7.0 fl oz per acre	2

Active Ingredient(s)	Product	Manufacturer	Application Method & Rates		# Trials
Imidacloprid, continued	Nuprid 2F	Nufarm	Foliar	1.3 fl oz per acre	1
	Pasada 1.6F	ADAMA	Foliar	3.5 fl oz per acre	1
				3.8 fl oz per acre	1
	Provado 1.6F	Bayer	Foliar	1.9 fl oz per acre	1
				3.8 fl oz per acre	15
				6.3 fl oz per acre	7
				8 fl oz per acre	3
				0.10 lb ai per acre	1
Lambda-cyhalothrin	Warrior 1EC	Syngenta	Foliar	0.03 lb ai per acre	1
				0.04 lb ai per acre	1
				4 fl oz per acre	3
				5 fl oz per acre	1
	Warrior II			1.9 fl oz per acre	4
				2.6 fl oz per acre	1
Malathion	Malathion 8	Multiple	Foliar	16 fl oz per acre	3
Neem Oil	Neem Oil 70%	Monterey	Foliar	7.8 ml per liter	1
	Trilogy	Certis		32 fl oz per acre	1
Petroleum Oil	Suffoil-X	BioWorks	Foliar	15 ml per liter	1
Potassium Salts of Fatty Acids	M-Pede	Gowan	Foliar	1 % v/v	1
				2 % v/v	3
Pymetrozine	Fullfill 50WG	Syngenta	Foliar	1.4 oz per acre	1
				2.8 oz per acre	17
				0.086 lb ai per acre	1
Pyrethrins	Pyganic 1.4EC	Valent	Foliar	11.7 ml per liter	1
Pyrifluquinazon	NNI-0101 20SC, Pyrifluquinazon 20SC	Nichino	Foliar	2.4 fl oz per acre	1
				3.2 fl oz per acre	6
				6.4 fl oz per acre	2
				12.7 fl oz per acre	2
Pyriproxyfen	Knack 0.86EC	Valent	Foliar	8.5 fl oz per acre	1
Spirotetramat	Movento 150OD	Bayer	Foliar	5.0 fl oz per acre	1
				8.0 fl oz per acre	4
	Movento 2SC			4.0 fl oz per acre	4
				5.0 fl oz per acre	11
				6.0 fl oz per acre	2
				8.0 fl oz per acre	2
				9.0 fl oz per acre	4
	Ultor 150SC			0.10 lb ai per acre	1
				0.14 lb ai per acre	1
				8 fl oz per acre	2
				10 fl oz per acre	2
				12 fl oz per acre	2
				14 fl oz per acre	2
Sulfoxaflor	Closer 2SC	Dow	Foliar	1.5 fl oz per acre	3
				2.0 fl oz per acre	5
				3.0 fl oz per acre	5
				6.0 fl oz per acre	1
				4.0 fl oz per acre	1
				8.0 fl oz per acre	1
	Sulfoxaflor 2SC			4.3 fl oz per acre	1
				5.7 fl oz per acre	1
	Transform WG			1.5 oz per acre	4
				1.75 oz per acre	1

Active Ingredient(s)	Product	Manufacturer	Application Method & Rates		# Trials
Thiacloprid	Calypso 4F	Bayer	Foliar	0.12 and 0.18 lb ai per acre	1
Thiamethoxam	Actara 25W	Syngenta	Foliar	1.5 oz per acre	4
				2.0 oz per acre	1
				3.0 oz per acre	11
				4.5 oz per acre	5
				5.5 oz per acre	3
				11.5 oz per acre	1
				0.022 lb ai per acre	1
	Centric 40WG		Foliar	3.5 oz per acre	2
	Platinum 2SC		Soil	2.7 fl oz per acre	1
				4.5 fl oz per acre	1
				6.0 fl oz per acre	1
				8.0 fl oz per acre	2
				9.0 fl oz per acre	1
	Platinum 75SG			2.7 oz per acre	1
Tolfenpyrad	NAI-2302	Nichino	Foliar	17 fl oz per acre	1
				21 fl oz per acre	1
	Tolfenpyrad 15EC			20 fl oz per acre	1
	Torac 15EC			21 fl oz per acre	3

Comparative Efficacy on Acyrthosiphon lactucae

In 2003, Palumbo conducted a trial to determine efficacy of several insecticides applied as foliar or soil treatments for control of various aphids, including *Acyrthosipon lactucae*, on lettuce (*Lactuca sativa)*. The at-planting soil applications of Admire and Platinum were applied as a pre-plant injection at a depth of 1.5 inches below the seed line at bed shaping in 15 gpa final dilution. The side-dress treatments were applied at second side dress (15 Jan) similar to fertilizer side. A total of three spray applications were applied on Jan 21, Feb 4 and Feb 16. An adjuvant was applied to all foliar treatments; DyneAmic on the first application and Exit on the second and third applications at 0.125% v/v. All the foliar treatments provided excellent control of *Acyrthosipon lactucae*, while Dinotefuran was mediocre (Table 3). Admire and Platinum applied to soil also provided excellent control but Dinotefuran looked ineffective.

In 2005, Palumbo conducted a trial to determine efficacy of Assail, Beleaf, Movento and Provado applied foliar for control of several aphids, including *Acyrthosipon lactucae*, on lettuce (*Lactuca sativa)*. All products provided significant control of a low infestation, with Provado providing 100 % control (Table 4).

Table 3. Efficacy on Acyrthosipon lactucae on Lettuce (*Lactuca sativa*), Palumbo, AZ, 2003.

Treatment (Active Ingredient)	Rate Per Acre	Timing	Population Counts z, Means Separations y, and Percent Control x	
			Frame Leaves	Heads
Actara 50W (thiamethoxam)	3.0 oz	Foliar	0.0 c (100)	0.0 c (100)
Assail 70WP (acetamiprid)	1.7 oz	Foliar	3.2 bc (98)	1.3 c (97)
Dinotefuran 20SG (dinotefuran)	4.0 oz	Foliar	44.1 a (77)	8.6 b (78)
Flonicamid 50DF (flonicamid)	8.0 oz	Foliar	0.0 c (100)	0.2 c (99)
Fulfill 50WG (pymetrozine)	2.7 oz	Foliar	1.6 bc (99)	2.8 bc (93)
Admire 2F (imidacloprid)	16 fl oz	Soil - at planting	0.3 bc (100)	0.6 c (98)
Dinotefuran 20SG (dinotefuran)	1.1 lb	Soil - sidedress	117.7 a (40)	22.0 a (44)
Platinum 2SC (thiamethoxam)	8.0 fl oz	Soil - at planting	1.0 bc (99)	0.0 c (100)
Platinum 2SC (thiamethoxam)	8.0 fl oz	Soil - sidedress	7.1 b (96)	1.2 bc (97)
Untreated	-	-	194.8 a 0()	39.1 a (0)

Data from AMT Vol 29: E46.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of apterous aphids per plant at harvest.

[x] Percent control was calculated on the number of apterous aphids per plant at harvest.

Table 4. Efficacy on Acyrthosipon lactucae on Lettuce (*Lactuca sativa*), Palumbo, AZ, 2005.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		Pre	12 DAT	27 DAT
Assail 30SG (acetamiprid)	4.0 oz	14.0 a	10.4 a (56)	1.0 b (65)
Beleaf 50SG (flonicamid)	2.3 oz	14.4 a	14.4 a (41)	0.3 b (90)
Movento 150OD (spirotetramat)	8 fl oz	14.8 a	1.0 a (96)	0.3 b (90)
Provado 1.6 F (imidacloprid)	6.3 fl oz	12.0 a	0.3 a (98)	0.0 b (100)
Untreated	-	13.1 a	22.2 a (0)	2.7 a (0)

Data from AMT Vol 32: E17.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of apterous aphids per plant.

[x] Henderson's percent control was calculated on the number of apterous aphids per plant.

Comparative Efficacy on Acyrthosiphon pisum

In 2005, Eigenbrode conducted a trial to determine efficacy of several insecticides applied foliar with Syn-Tac buffer and spreader sticker for control pea aphids (*Acyrthosiphon pisum)* on field pea (*Pisum sativum*). Dimethoate provided the most effective control at 7 DAT and 14 DAT, followed by Capture, Warrior, Provado, Assail and Fulfill (Table 5).

Table 5. Efficacy on Pea Aphid (*Acyrthosiphon pisum*) on Field Pea (*Pisum sativum)*, Eigenbrode, ID, 2005.

Treatment (Active Ingredient)	Rate (Lb ai/acre)	Population Counts [z], Means Separations [y], and Percent Control [x]		Yield (Lb/A)
		7 DAT	14 DAT	
Assail TD 2480-01(acetamiprid)	0.025	32.3 b (54)	22.2 b (85)	812 b
Assail TD 2480-01(acetamiprid)	0.05	17.5 cd (75)	12.0 bc (92)	1129 ab
Capture 2EC (bifenthrin)	0.04	9.5 d (86)	5.5 c (96)	1166 a
Dimethoate 4EC (dimethoate)	0.5	1.3 e (98)	1.7 d (99)	1155 a
Fullfill 50 WG (pymetrozine)	0.086	30.3 bc (56)	38.8 b (74)	663 bc
Provado 1.6 F (imidacloprid)	0.1	11.8 cd (83)	14.3 bc (90)	1161 a
Warrior 1EC (lambda-cyhalothrin)	0.03	9.5 d (86)	8.8 c (94)	1164 a
Untreated	-	69.6 a (0)	147.0 a (0)	514 c

Data from AMT Vol 31: F30. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of aphids per stem.

[x] Percent control was calculated on the number of aphids per stem.

In 2013, Natwick conducted a trial to determine efficacy of several insecticides applied foliar with Activator 85 adjuvant on Jan 17 for the control of several aphids, including the pea aphid (Acyrthosiphon pisum), on alfalfa (Medicago sativa). Centric, Dimethoate, Lorsban, Malathion and Warrior provided excellent control up to 14 DAT; Beleaf and Transform were less effective (Table 6).

Comparative Efficacy on Aphis craccivora

In 2012 and 2013, Natwick conducted two trials to determine efficacy of several insecticides applied foliar with Activator 85 adjuvant for the control of cowpea aphids (*Aphis craccivora)* on alfalfa (*Medicago sativa).* In the 2012 trial, all treatments significantly reduced aphid numbers up to 14 DAT, with Malathion providing the best control (Table 7). In the 2013 trial, Centric, Dimethoate, Lorsban, Malathion and Warrior provided excellent control up to 14 DAT; Beleaf and Transform were less effective (Table 8).

Table 6. Efficacy on Pea Aphid (*Acyrthosiphon pisum*) on Alfalfa (*Medicago sativa)*, Natwick, CA, 2013.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]					
		Pretreat	5 DAT	8 DAT	11 DAT	14 DAT	Posttreat Ave.
Beleaf 50 SG (flonicamid)	2.24 oz	0.18 a	0.13 bc (83)	0.50 b (29)	1.25 b (82)	4.03 b (84)	1.48 b (63)
Centric 40 WG (thiamethoxam)	3.5 oz	0.60 a	0.03 c (99)	0.00 e (100)	0.20 cd (99)	0.28 b (99)	0.13 ef (99)
Dimethoate 2.67 EC (dimethoate)	16.0 fl oz	0.50 a	0.45 abc (78)	0.08 cde (96)	0.53 bcd (97)	1.85 b (91)	0.73 b-f (93)
Lorsban Advanced (chlorpyrifos)	32 fl oz	0.78 a	0.25 bc (92)	0.00 e (100)	0.25 cd (99)	0.13 b (99)	0.16 ef (99)
Malathion 8 (malathion)	16.0 fl oz	0.00 a	0.35 bc (74)	0.23 bcd (83)	0.65 bc (95)	1.03 b (93)	0.56 b-e (92)
Transform WG (sulfoxaflor)	1.5 oz	0.56 b	0.56 b (76)	0.56 b (76)	2.10 bc (90)	4.88 b (79)	1.87 bd (85)
Warrior IICS (lambda-cyhalothrin)	1.92 fl oz	0.60 a	0.10 bc (96)	0.03 de (99)	0.38 cd (98)	0.45 b (98)	0.28 de (98)
Untreated	-	0.33 a	1.33 a (0)	1.33 a (0)	12.88 a (0)	13.83 a (0)	7.34 a (0)

Data from AMT Vol 39: F66. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of aphids per sweep.

[x] Henderson's percent control was calculated on the number of aphids per sweep.

Table 7. Efficacy on Cowpea Aphid (*Aphis craccivora*) on Alfalfa (*Medicago sativa)*, Natwick, CA, 2012.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]					
		Pretreat	3 DAT	7 DAT	14 DAT	21DAT	Posttreat Ave.
Beleaf 50 SG (flonicamid)	2.24 oz	206.9 a	77.3 b (28)	54.4 b (34)	38.1 b (39)	11.7 a (37)	45.4 b (33)
Dimethoate 2.67 EC (dimethoate)	16.0 fl oz	225.2 a	39.0 b (66)	15.9 c (82)	12.2 c (82)	5.8 a (70)	18.2 c (75)
Malathion 8 (malathion)	16.0 fl oz	2135.8 a	47.8 b (96)	16.6 c (98)	13.5 c (98)	7.5 a (96)	21.3 c (97)
Transform WG (sulfoxaflor)	1.5 oz	196.8 a	75.6 b (26)	44.0 b (44)	16.4 bc (72)	4.6 a (74)	35.1 bc (45)
Transform WG (sulfoxaflor)	1.75 oz	217.5 a	75.1 b (33)	20.7 c (76)	16.1 bc (75)	7.6 a (61)	29.9 b (58)
Untreated	-	238.8 a	123.5 a (0)	95.3 a (0)	71.9 a (0)	21.3 a (0)	78.0 a (0)

Data from AMT Vol 38: F2. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of aphids per stem.

[x] Henderson's percent control was calculated on the number of aphids per stem.

Table 8. Efficacy on Cowpea Aphid (*Aphis craccivora*) on Alfalfa (*Medicago sativa)*, Natwick, CA, 2013.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]					
		Pretreat	5 DAT	8 DAT	11 DAT	14 DAT	Posttreat Ave.
Beleaf 50 SG (flonicamid)	2.24 oz	39.1 a	17.4 b-d (75)	17.1 bc (69)	28.1 b (67)	32.0 ab (66)	23.6 b (69)
Centric 40 WG (thiamethoxam)	3.5 oz	43.4 a	11.6 cd (85)	10.5 c (83)	4.6 c-f (95)	3.2 d-f (97)	7.5 d-g (91)
Dimethoate 2.67 EC (dimethoate)	16.0 fl oz	43.4 a	3.6 d (95)	6.6 de (89)	4.3 cd (95)	4.4 de (96)	4.8 fg (94)
Lorsban Advanced (chlorpyrifos)	32 fl oz	47.1 a	23.2 bc (72)	9.5 c (86)	1.9 d-f (98)	0.9 f (99)	8.9 de (90)
Malathion 8 (malathion)	16.0 fl oz	59.5 a	9.6 cd (91)	3.6 de (96)	2.6 d-f (98)	6.0 cd (96)	5.5 fg (95)
Transform WG (sulfoxaflor)	1.5 oz	42.0 a	8.8 cd (88)	18.5 b (69)	14.1 bc (84)	24.8 bc (75)	16.6 bc (80)
Warrior IICS (lambda-cyhalothrin)	1.92 fl oz	49.2 a	11.0 cd (87)	7.5 de (89)	1.9 c-f (98)	2.7 d-f (98)	5.8 e-g (94)
Untreated	-	34.4 a	60.7 a (0)	48.9 a (0)	74.2 a (0)	81.8 a (0)	66.4 a (0)

Data from AMT Vol 39: F66. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of aphids per sweep.

[x] Henderson's percent control was calculated on the number of aphids per sweep.

Comparative Efficacy on Aphis gossypii

In 1998, Smitley conducted a greenhouse trial to determine efficacy of several insecticides applied foliar for the control of melon aphids (*Aphis gossypii)* on zinnia (*Zinnia elegans*). All treatments significantly reduced aphid numbers after the first application (Table 9). The BotaniGard WP formulation gave very good control after two applications. Two more weekly applications were also applied to these plants and the population remained low throughout the test. Orthene and Talstar reduced the aphid population significantly and kept it low throughout the test with only two applications. Avid worked well after the 2nd and 3rd applications, but aphid populations rebounded two weeks after the last application compared with 3 or 4 applications of other products. Mesurol, Azatin and Botanigard ES looked inferior to the other products.

In 2002, Bethke conducted a greenhouse trial to determine efficacy of several insecticides applied foliar or drench for the control of melon aphids (*Aphis gossypii)* on chrysanthemum (*Chrysanthemum x morifolium*). Foliar applications were applied to runoff, and drench applications applied using the recommended rate of formulated product in a liter of water and applying 120 ml of solution to water saturated plant medium. All treatments significantly reduced aphid numbers 5 days after treatment (Table 10). Melon aphid populations rebounded 17 DAT in the two foliar applications of V-10112 and the lower rate of Flonicamid. All other treatments caused significant population reductions at 17 DAT. In addition, no aphids were present on plants treated with the three drench applications - Marathon II, and both rates of V-10112.

In 2002, Nielsen conducted a greenhouse trial to examine efficacy of Aria 50WG for managing melon aphid (A. gossypii) on New Guinea impatiens. Two foliar applications were made 7 days apart, with the first evaluation occurring prior to the second application. By the first evaluation, 7 days after first treatment, no aphids were present in the flonicamid-treated plants (Table 11).

In 2004, Liu conducted a trial to determine efficacy of Actara, Assail, Knack, Provado and Warrior applied foliar on May 18 and 24 for the control of insect pests, including melon aphids (*Aphis gossypii),* on cantaloupe (*Cucumis melo)*. All products provided good control of a high melon aphid infestation (Table 12).

In 2005, Kuhar conducted a trial to determine efficacy of several insecticides applied foliar on August 1 and 24 for the control of melon aphids (*Aphis gossypii)* and other pests on pumpkin (*Cucurbita pepo)*. Venom at the high rate was the only treatment that significantly reduced melon aphid infestation 5 days after the second application (Table 13).

In 2004, Ludwig conducted an IR-4 efficacy and crop safety trial examining Flonicamid DF for managing cotton aphid (*Aphis gossypii*) on rose (*Rosa hybrid*a). Two foliar applications were made approximately 1 week apart. Within one week after the first application, excellent control was achieved with all tested rates (Table 14).

In 2008, Gu conducted a greenhouse trial to determine efficacy of several insecticides applied foliar or drench on August 26 for the control of cotton aphids (*Aphis gossypii)* on gerbera daisy (*Gerbera jamesonii*). All products provided excellent control of a high cotton aphid infestation (Table 15).

Table 9. Efficacy on Melon Aphid (*Aphis gossypii*) on Zinnia (*Zinnia elegans)*, Smitley, MI, 1998.

Treatment (Active Ingredient)	Rate Per 100 Gal	Applic. Dates	Population Counts [z], Means Separations [y], and Percent Control [x]				
			5/19 (Pre)	5/27	6/2	6/9	6/16
Avid 0.15EC (abamectin)	8.0 fl oz	5/20, 5/27, 6/3	66.5 a	25.2 bc (84)	3.2 ab (94)	5.7 abc (94)	39.2 ef (60)
Azatin XL (azadirachtin)	5.0 oz	5/20, 5/27, 6/3	56.7 a	38.3 c (71)	22.5 b-f (49)	23.8 d-g (69)	48.2 ef (42)
Botanigard 22WP (Beauvaria bassiana)	1 lb	5/20, 5/27, 6/3, 6/10	59.8 a	28.7 c (79)	3.5 ab (92)	1.8 a (98)	12.2 bcd (86)
Botanigard ES (Beauvaria bassiana)	1 pt	5/20, 5/27, 6/3, 6/10	51.5 a	32.0 c (73)	10.5 a-d (74)	26.7 b-e (62)	40.7 def (46)
	1 qt	5/20, 5/27, 6/3, 6/10	65.2 a	29.7 c (80)	12.7 a-e (75)	18.6 a-d (79)	31.0 cde (68)
Mesurol 75WP (methiocarb)	0.5 lb	5/20, 5/27, 6/3	54.5 a	40.0 c (68)	43.0 ef (0)	48.3 efg (35)	99.5 f (0)
	1.0 lb	5/20, 5/27, 6/3	42.8 a	41.8 c (58)	48.2 f (0)	45.7 d-g (22)	59.3 ef (6)
Orthene 75S (acephate)	0.647 lb	5/20, 5/27	58.8 a	17.0 bc (88)	6.7 abc (85)	6.0 ab (93)	6.5 a (92)
Talstar 0.66EC (bifenthrin)	12 fl oz	5/20, 5/27	62.8 a	0.7 a (99)	8.2 abc (83)	3.7 a (96)	15.5 ab (83)
Untreated	-	-	61.0 a	141.0 d (0)	47.2 f (0)	83.7 g (0)	90.0 ef (0)

Data from AMT Vol 24: G81. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of aphid adults per plant.

[x] Henderson's percent control was calculated on the number of aphid adults per plant.

Table 10. Efficacy on Melon Aphid (*Aphis gossypii*) on Chrysanthemum (*Chrysanthemum x morifolium*), Bethke, CA, 2002.

Treatment (Active Ingredient)	Rate Per 100 Gal	Population Counts [z], Means Separations [y], and Percent Control [x]		
		Pre	5 DAT	17 DAT
Flonicamid 50DF (flonicamid)	2.82 oz	40.4 a	38.0 b (57)	56.2 b (31)
	5.64 oz	21.2 a	2.8 d (94)	14.2 c (67)
Marathon II (imidacloprid)	1.7 fl oz	37.8 a	6.4 cd (92)	2.4 c (97)
	0.025 ml / pot	27.2 a	3.6 d (94)	0.0 c (100)
V-10112 20SG (dinotefuran)	4.0 oz	29.6 a	15.8 cd (76)	73.2 ab (0)
	8.0 oz	43.6 a	15.6 cd (84)	97.4 a (0)
	0.22 g / pot	21.6 a	0.2 d (100)	0.0 c (100)
	0.43 g / pot	47.4 a	0.0 d (100)	0.0 c (100)
Untreated	-	43.2 a	95.2 a (0)	87.2 ab (0)

Data from AMT Vol 29: G29. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of apterous aphids per terminal.

[x] Henderson's percent control was calculated on the number of apterous aphids per terminal.

Table 11. Efficacy on Melon Aphids (*Aphis gossypii)* on New Guinea Impatiens (*I. walleriana)*, Nielsen, OH, 2002.

Treatment (Active Ingredient)	Rate (Product/100 gal)	Population Counts [z]			
		7 DAT	14 DAT	21 DAT	28 DAT
Flonicamid 50WG (flonicamid)	60 g	0	0	0	0
	120 g	0	0	0	0
	240 g	0	0	0	0
Untreated	-	18	26	15	3

2002 IR-4 Efficacy and Crop Safety Trial

[z] Number of aphids per sample.

Table 12. Efficacy on Melon Aphids (*Aphis gossypii)* on Cantaloupe (*Cucumis melo)*, Liu, 2004.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]			
		5/17 (Pre)	5/25	6/2	6/9
Actara 25W (thiamethoxam)	4 oz	18.5 a	2.9 b (82)	1.2 b (92)	0.1 b (90)
Assail 70WP (acetamiprid)	0.9 oz	19.0 a	3.3 b (80)	1.2 b (93)	0.1 b (90)
Knack 0.86EC (pyriproxyfen)	8.5 fl oz	18.1 a	3.5 b (78)	1.3 b (92)	0.3 b (68)
Provado 1.6F (imidacloprid)	3.7 fl oz	18.7 a	3.5 b (78)	1.3 b (92)	0.0 b (100)
Warrior 1CS (lambda-cyhalothrin)	3.76 fl oz	17.1 a	4.0 b (73)	1.9 b (87)	0.3 b (66)
Untreated	-	17.3 a	15.0 a (0)	14.9 a (0)	0.9 a (0)

Data from AMT Vol 30: E16.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of aphids per leaf.

[x] Henderson's percent control was calculated on the number of aphids per leaf.

Table 13. Efficacy on Melon Aphids (*Aphis gossypii)* on Pumpkin (*Cucurbita pepo)*, Kuhar, VA, 2005.

Treatment (Active Ingredient)	Rate (Product/acre)	Population Counts [z], Means Separations [y], and Percent Control [x] 8/29
Provado 1.6F (imidacloprid)	3.5 fl oz	6.3 ab (78)
V-10170 50WDG (flonicamid)	1.0 oz	11.5 ab (60)
	1.4 oz	12.5 ab (56)
	1.8 oz	5.8ab (80)
Venom 20SG (dinotefuran)	7.0 oz	10.0 ab (65)
	10.6 oz	2.5 b (91)
Untreated	-	28.5 a (0)

Data from AMT Vol 31: E63. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).
[z] Number of aphids per 5 leaves.
[x] Percent control was calculated on the number of aphids per 5 leaves.

Table 14. Efficacy on Melon Aphids (*Aphis gossypii)* on Rose (*Rosa hybrida)*, Ludwig, TX, 2005.

Treatment (Active Ingredient)	Rate (Product/100 gal)	Population Counts [z]			
		Pre Count	8/25/13	9/2/13	9/8/13
Flonicamid DF (flonicamid)	60 g	30.5	0.5	0.3	0.0
	120 g	25.0	0.0	0.0	0.0
	240 g	32.5	0.0	0.0	0.0
Untreated	-	26.3	36.8	73.3	38.3

2005 IR-4 Efficacy and Crop Safety Trial
[z] Number of aphids per 12 leaves.

Table 15. Efficacy on Cotton Aphids (*Aphis gossypii)* on Gerbera Daisy (*Gerbera jamesonii*), Gu, MS, 2008.

Treatment (Active Ingredient)	Rate Per 100 Gal	Population Counts [z], Means Separations [y], and Percent Control [x]			
		7 DAT	14 DAT	21 DAT	36 DAT
Flagship 25 WG (thiamethoxam)	4 oz (drench)	0.0 b (100)	0.0 b (100)	0.0 b (100)	0.7 c (97)
	4 oz (spray)	0.0 b (100)	0.0 b (100)	0.0 b (100)	1.8 bc (93)
Safari 20 SG (dinotefuran)	8 oz (spray)	0.0 b (100)	0.2 b (99)	0.0 b (100)	0.7 c (97)
	24 oz (drench)	0.0 b (100)	0.0 b (100)	0.0 b (100)	0.2 c (99)
Tristar 30 SG (acetamiprid)	1.3 oz (spray)	0.0 b (100)	0.0 b (100)	0.0 b (100)	6.3 b (74)
	2.7 oz (spray)	0.0 b (100)	0.3 b (99)	0.0 b (100)	2.0 bc (92)
Untreated	-	35.8 a (0)	24.3 a (0)	82.0a (0)	24.3 a (0)

Data from AMT Vol 34: G33. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on Tukey's HSD (P = 0.1).
[z] Number of aphids per 2 leaves.
[x] Percent control was calculated on the number of aphids per 2 leaves.

In 2011, Kuhar conducted a trial to determine efficacy of several insecticides applied foliar on Aug 23, 30, and Sept 7 for the control of foliar insects, including a moderately high population of melon aphids (*Aphis gossypii),* on summer squash (*Cucurbita pepo)*. HGW86 provided the best control throughout the duration of trial; Coragen was less effective and Warrior considerably flared aphids (Table 16).

In 2011, Price conducted a trial to determine efficacy of several insecticides applied foliar on March 24 for the control of melon aphids (*Aphis gossypii),* on strawberry (*Fragaria ananassa)*. All products provided excellent control of melon aphids (Table 17).

In 2012, Grafton-Cardwell conducted a trial to determine efficacy of several insecticides applied foliar with Omni 6E Oil at 0.25% v/v on March 22 for the control of cotton aphids (*Aphis gossypii)* on citrus (*Citrus sinensis*)*.* All treatments significantly reduced the number of aphid-infested terminals for 3 wk after treatment (Table 18). By 28 days post treatment, all chemicals except for Requiem continued to show significant control.

Table 16. Efficacy on Melon Aphids (*Aphis gossypii)* on Summer Squash (*Cucurbita pepo)*, Kuhar, VA, 2011.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]			
		8/30	9/6	9/13	9/22
Coragen (chlorantraniliprole)	3.5 fl oz	13.3 cd (91)	133.3 c (26)	60.0 b (56)	54.5 a (0)
	5.0 fl oz	10.3 cd (93)	28.0 c (84)	84.3 b (38)	36.3 ab 9()
HGW86 10SE (cyantraniliprole)	10.1 fl oz	15.5 cd (89)	19.8 c (89)	2.0 b (98)	2.5 b (94)
	13.5 fl oz	15.3 cd (90)	3.8 c (98)	7.8 b (94)	5.0 b (88)
	16.9 fl oz	4.0 d (97)	6.3 c (96)	1.5 b (99)	2.5 b (94)
	20.5 fl oz	5.0 d (97)	5.5 c (97)	6.3 b (95)	0.0 b (100)
Warrior II (lambda-cyhalothrin)	1.9 fl oz	254.5 a (0)	813.0 a (0)	2911.3 a (0)	76.3 a (0)
Untreated	-	145.8 b (0)	179.3 bc (0)	135.0 b (0)	40.0 ab (0)

Data from AMT Vol 37: E56. Not all products tested included in table.
Coragen and HGW86 applied with MSO at 0.25 % v/v.
[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).
[z] Number of aphids per 10 leaves.
[x] Percent control was calculated on the number of aphids per 10 leaves.

Table 17. Efficacy on Melon Aphids (*Aphis gossypii)* on Strawberry (*Fragaria ananassa)*, Price, FL 2011.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		Pre	6DAT	13 DAT
Assail 30SG (acetamiprid)	4 oz.	16.5 a	0.0 b (100)	0.0 b (100)
Movento 2SC (spirotetramat)	5 fl. oz.	5.8 a	1.3 b (31)	0.0 b (100)
	8 fl. oz.	14.3 a	0.3 b (97)	0.0 b (100)
NAI-2302 (tolfenpyrad)	21 fl. oz	25.8 a	2.8 b (85)	0.0 b (100)
NNI-0101 (pyrifluquinazon)	3.2 oz.	13.5 a	0.0 b (100)	0.0 b (100)
Untreated	-	15.0 a	11.0 a (0)	7.0 a (0)

Data from AMT Vol 37: C24.
Movento, NAI-2302 and NNI-0101 applied with Induce NIS at 32 fl oz per acre.
[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).
[z] Number of aphids per 5 min of observation.
[x] Percent control was calculated on the number of aphids per 5 min of observation.

Table 18. Efficacy on Cotton Aphid (*Aphis gossypii*) on Citrus (*Citrus sinensis)*, Grafton-Cardwell, CA, 2012.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]					
		3/14 (Pre)	7 DAT	14 DAT	21 DAT	28 DAT	36 DAT
Actara 25 WG (thiamethoxam)	5.5 oz	4.7 a	0.1 c (98)	0.0 c (100)	0.0 d (100)	0.3 bc (88)	0.0 a (100)
Altacor WDG (chlorantraniliprole)	3 oz	5.3 a	5.3 b (24)	1.2 b (70)	0.2 cd (96)	0.9 b (67)	0.0 a (100)
Assail 70 WP (acetamiprid)	4.7 oz	4.8 a	0.2 c (97)	0.0 c (100)	0.0 d (100)	0.0 c (100)	0.0 a (100)
Exirel 10 SE (cyantraniliprole)	13.5 fl oz	5.0 a	0.1 c (98)	0.0 c (100)	0.2 cd (96)	0.0 c (100)	0.0 a (100)
Requiem EC (Chenopodium ambrosioides extract)	4 qt	5.6 a	3.2 b (57)	1.4 b (66)	2.7 b (46)	4.0 a (0)	0.1 a (45)
Untreated	-	6.2 a	8.2 a (0)	4.6 a (0)	5.5 a (0)	3.2 a (0)	0.2 a (0)

Data from AMT Vol 38: D6. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).

[z] Number of aphid-infested terminals.

[x] Henderson's percent control was calculated on the number of aphid-infested terminals.

Comparative Efficacy on Aphis spiraecola

In 2007, Hogmire conducted two trials to determine efficacy of several insecticides applied foliar for the control of foliar insects, including spirea aphids (*Aphis spiraecola),* on apple (*Malus domestica)*. In the first trial, Actara, Assail, and Beleaf provided excellent control of spirea aphids, whereas Warrior was also effective, but weaker (Table 19). In the second trial, Ultor provided excellent control; Assail was less effective while Calypso looked ineffective (Table 20).

Table 19. Efficacy on Spirea Aphids (*Aphis spiraecola)* on Apple (*Malus domestica)*, Trial 1, Hogmire, WV, 2007.

Treatment (Active Ingredient)	Rate (lb ai/A)	Application Dates	Population Counts [z] and Means Separations [y]			
			5/30	6/6	6/13	6/20
Actara 25 WG (thiamethoxam)	0.022	4/19, 5/9, 5/24	0.4 cde	1.4 de	1.3 ef	1.5 ab
Assail 30SG (acetamiprid)	0.11	4/19, /6/6	0.3 de	1.8 cde	1.1 f	0.9 b
Beleaf 50 SG (flonicamid)	0.06 and 0.09	4/19, 5/9, 6/6	0.3 cde	1.7 de	1.1 f	1.0 b
Warrior 1CS (lambda-cyhalothrin)	0.017 and 0.04	4/19, 5/9, 5/24	0.6 bcd	1.9 bcd	1.9 bcd	1.9 a
Untreated	-	-	1.7 a	3.1 a	2.5 a	2.0 a

Data from AMT Vol 33: A3. Not all products tested included in table.
Actara and Warrior applied with LI-700 at 1 qt per acre.
[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).
[z] Rating for SA/most infested leaf/terminal: 0 = no aphids, 1 = 1-20 aphids, 2 = 21-100 aphids, 3 = 101-200 aphids, and 4 = >200 aphids.

Table 20. Efficacy on Spirea Aphids (*Aphis spiraecola)* on Apple (*Malus domestica)*, Trial 2, Hogmire, WV, 2007.

Treatment (Active Ingredient)	Rate (lb ai/A)	Application Dates	Population Counts [z] and Means Separations [y]		
			6/5	6/12	6/19
Assail 30SG (acetamiprid)	0.09 and 0.13	4/25, 5/9	2.2 b	1.2 b	1.5 b
Calypso 4F (thiacloprid)	0.12 and 0.18	4/25, 5/9	2.5 ab	2.2 a	2.4 a
Ultor 150SC (spirotetramat)	0.10	4/25, 6/7	3.0 a	1.6 b	0.7 c
Ultor 150SC (spirotetramat)	0.14	4/25, 6/7	2.7 ab	1.5 b	0.7 c
Untreated	-	-	3.0 a	2.1 a	2.2 a

Data from AMT Vol 33: A4. Not all products tested included in table.
Ultor applied with LI-700 at 1 qt per acre.
[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).
[z] Rating for SA/most infested leaf/terminal: 0 = no aphids, 1 = 1-20 aphids, 2 = 21-100 aphids, 3 = 101-200 aphids, and 4 = >200 aphids.

Comparative Efficacy on Aulacorthum solani

In 2003, Smitley conducted a greenhouse trial to determine efficacy of several insecticides applied foliar on March 13 for the control of foxglove aphids (*Aulacorthum solani)* on bugle (*Ajuga reptans*). Orthene, Marathon II + B1956, F1785 at the highest rate and Endeavor provided excellent control of foxglove aphids (Table 21). The V-10112 treatments were not significantly different from the Untreated at any time during the test.

In 2003, Palumbo conducted a trial to determine efficacy of several insecticides applied as foliar or soil treatments for control of various aphids, including foxglove aphids (*Aulacorthum solani),* on lettuce (*Lactuca sativa)*. The at-planting soil applications of Admire and Platinum were applied as a pre-plant

injection at a depth of 1.5 inches below the seed line at bed shaping in 15 gpa final dilution. The side-dress treatments were applied at second side dress (Jan 15) similar to fertilizer side dressing. A total of three spray applications were applied on Jan 21, Feb 4 and Feb 16. An adjuvant was applied with all foliar treatments; DyneAmic on the first application and Exit on the second and third applications at 0.125% v/v. The foliar treatments Actara, Assail, Flonicamid and Fulfill provided good to excellent control of foxglove aphids, while Dinotefuran was mediocre (Table 22). In general soil treatments were less effective than foliar treaments.

Table 21. Efficacy on Foxglove Aphids (*Aulacorthum solani)* on Bugle (*Ajuga reptans*), Smitley, MI 2003.

Treatment (Active Ingredient)	Rate Per 100 Gal	Population Counts [z], Means Separations [y], and Percent Control [x]			
		3/11 (Pre)	3/18	3/20	3/25
Endeavor 50WG (pymetrozine)	50 oz	81.0 a	10.7 bc (93)	6.5 c (95)	18.5 d (87)
F1785 50WG (flonicamid)	0.71 oz	71.0 a	42.5 e-h (66)	23.0 d (79)	33.5 def (72)
	1.41 oz	67.5 a	31.8 def (74)	24.7 d (76)	32.7 d (72)
	2.82 oz	72.8 a	5.8 a (96)	2.3 bc (98)	4.2 bc (97)
Marathon II + B1956 (imidacloprid)	1.7 oz + 2 oz	66.0 a	0.5 a (100)	0.0 a (100)	9.0 bc (92)
Orthene 97 (acephate)	0.5 lb	64.7 a	0.4 a (100)	0.2 ab (100)	0.0 a (100)
V-10112 20SG (dinotefuran)	5.0 oz	62.7 a	96.8 hi (13)	116.7 e (0)	155.7 g (0)
	7.5 oz	62.7 a	63.8 hi (43)	80.0 e (16)	107.8 g (0)
	10.0 oz	71.3 a	45.7 efg (64)	95.4 e (12)	73.0 efg (40)
Untreated	-	69.2 a	123.4 i (0)	105.6 e (0)	118.7 g (0)

Data from AMT Vol 29: G23. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).

[z] Number of aphids per plant.

[x] Percent control was calculated on the number of aphids per plant.

Table 22. Efficacy on Foxglove Aphids (*Aulacorthum solani)* on Lettuce (*Lactuca sativa*), Palumbo, AZ, 2003.

Treatment (Active Ingredient)	Rate Per Acre	Timing	Population Counts [z], Means Separations [y], and Percent Control [x]	
			Frame Leaves	Heads
Actara 50W (thiamethoxam)	3.0 oz	Foliar	2.2 e (99)	0.9 e (99)
Assail 70WP (acetamiprid)	1.7 oz	Foliar	18.0 cd (92)	14.8 bc (79)
Dinotefuran 20SG (dinotefuran)	4.0 oz	Foliar	52.8 b (78)	28.4 ab (60)
Flonicamid 50DF (flonicamid)	8.0 oz	Foliar	2.7 e (99)	2.0 e (97)
Fulfill 50WG (pymetrozine)	2.7 oz	Foliar	1.5 e (99)	1.4 e (98)
Admire 2F (imidacloprid)	16 fl oz	Soil - at planting	43.6 bc (82)	8.0 cd (89)
Dinotefuran 20SG (dinotefuran)	1.1 lb	Soil - sidedress	82.3 b (66)	28.5 ab (60)
Platinum 2SC (thiamethoxam)	8.0 fl oz	Soil - at planting	39.4 bc (84)	22.6 bc (68)
Platinum 2SC (thiamethoxam)	8.0 fl oz	Soil - sidedress	64.4 b (73)	16.9 bc (76)
Untreated	-	-	239 a (0)	70.4 a (0)

Data from AMT Vol 29: E46.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of apterous aphids per plant at harvest.

[x] Percent control was calculated on the number of apterous aphids per plant at harvest.

In 2004, Palumbo conducted a trial to determine efficacy of several insecticides for control of various aphids, including foxglove aphids (*Aulacorthum solani),* on lettuce (*Lactuca sativa).* A total of four spray applications were applied on Jan 13 and 27, Feb 19, and Mar 4; first spray was initiated at early aphid colonization. An adjuvant DyneAmic on the at 0.125% v/v was mixed with all treatments. On the last two applications Capture 2E was combined with the Dimethoate treatment. Assail, Dimethoate, Flonicamid and Fulfill provided excellent control of a moderate foxglove aphid pressure, while Provado was less effective (Table 25).

In 2005, Palumbo conducted two trials to determine efficacy of several insecticides for control of several aphids, including foxglove aphids (*Aulacorthum solani),* on lettuce (*Lactuca sativa).* In the first trial, a total of three spray applications were applied on Jan 18 and 28, and Feb 9; first spray was initiated at early aphid colonization. An adjuvant DyneAmic on the at 0.125% v/v was applied to all treatments. Flonicamid provided excellent control of a moderate foxglove aphid pressure, while the neonicotinoids Assail and Provado were less effective (Table 23). In the second trial, insecticides were applied once as pre-harvest spray on Feb 24. Beleaf and Movento provided excellent control of a heavy foxglove aphid pressure at harvest, while the neonicotinoids Assail and Provado were less effective (Table 24).

Table 23. Efficacy on Foxglove Aphids (*Aulacorthum solani)* on Lettuce (*Lactuca sativa*), Trial 1, Palumbo, AZ, 2005.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		1/28	2/8	2/23
Assail 70WP (acetamiprid)	4.0 oz	3.9 a (0)	2.1 b (81)	10.5 ab (73)
Flonicamid 50DF (flonicamid)	2.3 oz	0.0 a (100)	0.1 b (99)	0.9 cd (98)
Provado 1.6F (imidacloprid)	3.75 fl oz	0.6 a (45)	0.6 b (95)	12.7 ab (67)
Untreated	-	1.1 a (0)	11.2 a (0)	38.9 a (0)

Data from AMT Vol 31: E31.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of apterous aphids per plant.

[x] Percent control was calculated on the number of apterous aphids per plant.

Table 24. Efficacy on Foxglove Aphids (*Aulacorthum solani)* on Lettuce (*Lactuca sativa*), Trial 2, Palumbo, AZ, 2005.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		2/24 (Pre)	3/8	3/23 (Harvest)
Assail 70WP (acetamiprid)	4.0 oz	14.6 a	51.9 ab (29)	77.6 b (40)
Beleaf 50SG(flonicamid)	2.3 oz	18.5 a	31.2 bc (67)	8.8 c (95)
Movento 150OD (spirotetramat)	8 fl oz	17.6 a	5.9 c (93)	2.6 c (98)
Provado 1.6F (imidacloprid)	6.3 fl oz	13.2 a	13.0 c (80)	44.3 bc (62)
Untreated	-	15.0 a	75.6 a (0)	133.7 a (0)

Data from AMT Vol 32: E17.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of apterous aphids per plant.

[x] Percent control was calculated on the number of apterous aphids per plant.

Table 25. Efficacy on Foxglove Aphids (*Aulacorthum solani)* on Lettuce (*Lactuca sativa*), Palumbo, AZ, 2004.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]					
		2/10	2/18	2/26	3/3	3/11	Harvest
Assail 70WP (acetamiprid)	1.7 oz	0.3 a	0.1 b (99)	0.6 b (99)	0.1 b (100)	0.5 b (99)	0.2 b (99)
Dimethoate 4E (dimethoate)	8 fl oz	0.0 a	0.0 b (100)	0.5 b (99)	1.0 b (98)	1.1 b (99)	0.5 b (99)
Flonicamid 50DF (flonicamid)	2.3 oz	0.0 a	0.2 b (99)	0.0 b (100)	0.2 b (100)	0.0 b (100)	0.0 b (100)
Fulfill 50WG (pymetrozine)	2.75 oz	0.0 a	0.5 b (97)	0.7 b (99)	0.2 b (100)	0.0 b (100)	0.0 b (100)
Provado 1.6F (imidacloprid)	3.75 fl oz	0.0 a	0.0 b (100)	1.6 b (97)	3.0 b (94)	11.4 b (85)	4.0 b (88)
Untreated Check	-	0.3 a	15.7 a (0)	52.4 a (0)	47.9 a (0)	77.1 a (0)	34.1 a (0)

Data from AMT Vol 30: E38. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).

[z] Number of apterous aphids per plant from 2/10 to 3/11, and per head at harvest.

[x] Percent control was calculated on the number apterous of aphids.

Comparative Efficacy on Dysaphis plantaginea

In 2002, Wise conducted a trial to determine efficacy of several insecticides applied foliar once on May 30 (petal fall stage) for the control of rosy apple aphids (*Dysaphis plantaginea),* on apple (*Malus domestica)*. Both treatments provided good reductions of RAA infestation one week post-application (Table 26).

In 2003, Wise conducted two trials to determine efficacy of several insecticides applied foliar for the control of rosy apple aphids (*Dysaphis plantaginea),* on apple (*Malus domestica)*. In the first trial, all products provided 100 % reduction of RAA infestation by June 11 (Table 27); in the second trial, all products provided 100 % reduction of RAA infestation by June 6 (Table 28).

Table 26. Efficacy on Rosy Apple Aphids (*Dysaphis plantaginea)* on Apple (*Malus domestica)*, Wise, MI, 2002.

Treatment (Active Ingredient)	Rate (oz/A)	Population Counts [z] and Means Separations [y], and % Control [x]		
		5/22 (Pre)	6/6	6/14
Actara 25 WG (thiamethoxam)	4.5	6.8 a	0.8 b (91)	2.0 ab (50)
Provado (imidacloprid)	8.0	5.3 a	1.0 b (88)	1.5 ab (62)
Untreated	-	6.0 a	7.5 a (0)	3.5 a (0)

Data from AMT Vol 28: A22. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).
[z] % infested spurs.
[x] Henderson's percent control was calculated on the % infested spurs.

Table 27. Efficacy on Rosy Apple Aphids (*Dysaphis plantaginea)* on Apple (*Malus domestica)*, Trial 1, Wise, MI, 2003.

Treatment (Active Ingredient)	Rate (oz/A)	Application Timing	Population Counts [z] and Means Separations [y], and % Control [x]	
			6/3	6/11
Actara 25 WG (thiamethoxam)	4.5	5/2, 5/22, 6/4	0.0 d (100)	0.0b (100)
Assail 70 WP (acetamiprid)	3.4	5/22, 6/4	2.0 bc (70)	0.0 b (100)
Provado 1. 6F (imidacloprid)	6.0	5/22, 6/4	3.0 b (63)	0.0 b (100)
Warrior 1CS (lambda-cyhalothrin)	4.0	5/2, 5/22, 6/4	0.0 d (100)	0.0 b (100)
	5.0	5/2, 5/22, 6/4	0.0 d (100)	0.0 b (100)
Untreated	-	-	12.1 a (0)	11.2 a (0)

Data from AMT Vol 29: A24. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).
[z] % infested spurs.
[x] Percent control was calculated on the % infested spurs.

Table 28. Efficacy on Rosy Apple Aphids (*Dysaphis plantaginea)* on Apple (*Malus domestica)*,Trial 2, Wise, MI, 2003.

Treatment (Active Ingredient)	Rate (oz/A)	Application Timing	Population Counts [z] and Means Separations [y], and % Control [x]		
			5/22	6/6	6/14
Actara 25 WG (thiamethoxam)	4.5	4/29	0.0 b (100)	0.0 b (100)	0.0 b (100)
Aza-Direct 0.99EC	32.0 fl oz	4/29, 5/23	0.7 b (83)	0.0 b (100)	0.0 b (100)
Provado 1. 6F (imidacloprid)	8.0	5/23	0.7 b (83)	0.0 b (100)	0.7 b (85)
Untreated	-	-	4.0 a	3.3 a	4.7 a

Data from AMT Vol 29:A25. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).

[z] % infested spurs.

[x] Percent control was calculated on the % infested spurs.

In 2007, Wise conducted a trial to determine efficacy of new foliar insecticides and rates with applications at Pink or Petal fall for the control of rosy apple aphids (*Dysaphis plantaginea),* on apple (*Malus domestica)*. Assail 30SG and Ultor 150SC applied on May 11 (petal fall stage) and May 29 (1st cover) Ultor was mixed with Tri-Fol buffering agent(0.5 pt/100 gal) and different adjuvants shown in Table 29. Both products provided excellent control of RAA infestations.

In 2009, Wise conducted a trial to determine efficacy of new insecticides and rates applied foliar once on May 1 (pink stage) for the control of rosy apple aphids (*Dysaphis plantaginea),* on apple (*Malus domestica)*. All products provided good to excellent control through the RAA season (Table 30).

In 2011, Wise conducted a trial to determine efficacy of several insecticides applied foliar once on May 12 (pink stage) for the control of rosy apple aphids (*Dysaphis plantaginea),* on apple (*Malus domestica)*. All products, except Provado, were mixed with Damoil at 1 % v/v. All products provided good to excellent control by June 1 (Table 31).

In 2013, Wise conducted a trial to determine efficacy of several insecticides applied foliar once for the control of rosy apple aphids (*Dysaphis plantaginea),* on apple (*Malus domestica)*. Pink applications of Closer, MBI-203 and MBI-203 + Damoil caused significant reductions in RAA within 7 days of application, and similar treatment effects were obtained from Sivanto at Bloom timing (Table 32). The declining RAA population seen in the untreated plots appeared to be due to predation from Asian lady beetle larvae.

Table 29. Efficacy on Rosy Apple Aphids (*Dysaphis plantaginea)* on Apple (*Malus domestica)*, Wise, MI, 2007.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]				
		5/15	5/18	5/24	6/1	6/6
Assail 30SG (acetamiprid)	2.5 oz	5.3 a (16)	0.4 b (96)	5.2 ab (54)	0.0 c (100)	0.4 b (97)
Ultor 150SC (spirotetramat) + MSO	8 fl oz + 0.25 %	3.3 a (48)	1.7 b (83)	5.3 ab (53)	0.0 c (100)	0.3 b (98)
	12 fl oz + 0.25 %	1.6 a (75)	0.5 b (95)	1.5 b (87)	0.0 c (100)	0.3 b (98)
Ultor 150SC (spirotetramat) + Damoil	8 fl oz + 0.5 %	1.4 a (78)	0.9 b (91)	2.7 ab (76)	0.0 c (100)	2.5 b (82)
Ultor 150SC (spirotetramat) + Induce	8 fl oz + 0.125 %	1.8 a (71)	0.8 b (92)	2.1 b (81)	0.0 c (100)	1.2 b (92)
	8 fl oz + 0.5 %	1.2 a (81)	1.2 b (88)	4.7 ab (58)	0.0 c (100)	0.7 b (95)
Ultor 150SC (spirotetramat) + Silwet	8 fl oz + 0.1 %	0.8 a (87)	0.5 b (95)	5.7 ab (49)	0.0 c (100)	0.0 b (100)
Untreated Check	-	6.3 a (0)	10.0 a (0)	11.2 a (0)	10.4 a (0)	14.2 a (0)

Data from AMT Vol 33: A24. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Duncan's New MRT (P=0.05).

[z] % infested terminals.

[x] Percent control was calculated on the % infested terminals.

Table 30. Efficacy on Rosy Apple Aphids (*Dysaphis plantaginea)* on Apple (*Malus domestica)*, Wise, MI, 2009.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]					
		5/28	6/1	6/5	6/11	6/18	6/26
HGW86 10SE (cyantraniliprole)	6.75 fl oz	1.2 cd (81)	0.3 b (96)	1.2 c-f (83)	1 cd (93)	0.7 bc (92)	0.7 b (72)
	10.1 fl oz	0.3 d (95)	1.4 b (83)	0.7 ef (90)	1.9 bcd (86)	2.3 bc (75)	0.0 b (100)
	13.5 fl oz	1.1 cd (82)	1.4 b (83)	1 def (86)	1.6 cd (88)	1.2 bc (87)	0.0 b (100)
HGW86 10SE + Induce NIS	13.5 fl oz + 1 % v/v	0.3 d (95)	0.0 b (100)	0.0 f (100)	0.0 d (100)	0.0 b (100)	0.0 b (100)
Lorsban 75WG (chlorpyrifos)	1 lb	0.0 d (100)	0.3 b (96)	0.3 ef (96)	0.4 cd (97)	0.3 bc (97)	0.0 b (100)
Movento 240SC (spirotetramat) + LI-700	6.0 fl oz + 0.25 % v/v	0.8 cd (87)	0.4 b (95)	0.3 ef (96)	0.0 d (100)	0.0 c (100)	0.0 b (100)
Untreated Check	-	6.2 ab (0)	8.0 a (0)	7.1 ab (0)	13.9 a (0)	9.2 a (0)	2.5a (0)

Data from AMT Vol 35: A19. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Duncan's New MRT (P=0.05).

[z] % infested spurs.

[x] Percent control was calculated on the % infested spurs.

Table 31. Efficacy on Rosy Apple Aphids (*Dysaphis plantaginea)* on Apple (*Malus domestica)*, Wise, MI, 2011.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]						
		5/10 (Pre)	5/13	5/16	5/18	5/26	6/1	6/8
Assail 30SG (acetamiprid)	1.7 oz	9.0 a	2.0 a (54)	0.8 c (84)	0.9 bc (76)	0.3 b (88)	0.0 b (100)	0.0 b (100)
HGW86 10SE (cyantraniliprole)	6.75 fl oz	8.8 a	5.2 a (00)	3.2 bc (35)	1.3 bc (65)	1.0 b (60)	0.0 b (100)	0.1 b (85)
	10.1 fl oz	11.5 a	4.2 a (25)	2.5 bc (61)	1.2 bc (75)	0.8 b (75)	0.1 b (87)	0.0 b (100)
	13.5 fl oz	10.8 a	3.1 a (41)	2.5 bc (59)	1.7 b (62)	0.2 b (93)	0.1 b (88)	0.0 b (100)
	16.9 fl oz	12.5 a	5.0 a (18)	3.6 ab (49)	0.8 bc (85)	0.1 b (97)	0.1 b (90)	0.0 b (100)
Provado 1.6F (imidacloprid)	6 fl oz	10.5 a	3.0 a (4)	2.1 bc (64)	1.1 bc (75)	0.3 b (90)	0.0 b (100)	0.0 b (100)
Untreated Check	-	10.3 a	5.0 a (0)	5.8 a (0)	4.3 a (0)	2.9 a (0)	0.8 a (0)	0.8a (0)

Data from AMT Vol 37: A13. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Duncan's New MRT (P=0.05).

[z] % infested spurs.

[x] Percent control was calculated on the % infested spurs.

Table 32. Efficacy on Rosy Apple Aphids (*Dysaphis plantaginea)* on Apple (*Malus domestica)*, Wise, MI, 2013.

Treatment (Active Ingredient)	Rate Per Acre	Applic. Timing*	Population Counts [z], Means Separations [y], and Percent Control [x]						
			5/15	5/17	5/20	5/28	6/6	6/10	6/17
Closer 2SC (sulfoxaflor) + R-11	3 fl oz + 0.125%	A	0.8 c (81)	0.0 c (100)	1.0 b (78)	0.5 bc (93)	1.5 b (90)	0.0 b (100)	0.5 a (90)
MBI 203 30DF (Chromobacterium subtsugae)	2 lb	A	0.8 c (81)	0.5 bc (85)	1.3 b (71)	2.0 bc (71)	3.0 b (80)	2.3 b (89)	3.0 a (40)
MBI 203 30DF +Damoil	2 lb + 1%	A	2.0 bc (53)	0.8 bc (76)	1.3 b (71)	4.5 ab (34)	11.0 a (26)	9.5 a (54)	7.8 a (0)
Sivanto 200SL(flupyridifurone) + R-11	10.5 fl oz + 0.125%	B	4.0 ab	0.0 c (100)	2.3 ab (49)	0.0 c (100)	3.3 b (78)	0.0 b (100)	0.5 a (90)
Untreated Check	-	-	4.3 ab (0)	3.3 a (0)	4.5 a (0)	6.8 a (0)	14.8 a (0)	20.5 a (0)	5.0 a (0)

Data from AMT Vol 39: A5. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Duncan's New MRT (P=0.05).

[z] % infested shoots.

[x] Percent control was calculated on the % infested shoots.

*Application timings: A, May 7 (Pink); B, May 13 (Bloom).

Comparative Efficacy on Eriosoma lanigerum

In 2001, Beers conducted a field trial to determine efficacy of several insecticides applied foliar on July 24 for the control of wooly apple aphids (*Eriosoma lanigerum),* on apple (*Malus domestica).* Dimethoate and Provado provided good control of WAA infestation one week post-application; Actara and Aza-Direct were inferior (Table 33).

Table 33. Efficacy on Wooly Apple Aphids (*Eriosoma lanigerum)* on Apple (*Malus domestica),* Beers, WA, 2001.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z] and Means Separations [y], and % Control [x]		
		7/13 (Pre)	7/31	8/14
Actara 25 WG (thiamethoxam)	2.75 oz	46.9 a	27.6 b (58)	4.8 a (43)
	5.5 oz	36.0 a	21.1 bc (58)	4.1 a (37)
Aza-Direct 0.099L (azadirachtin)	32 fl oz	33.8 a	16.9 bc (65)	2.5 a (54)
Dimethoate 4E (dimethoate) + Sylgard	16 fl oz + 1 pt/100gal	51.4 a	9.2 bc (87)	12.3 a (0)
Provado1.6F (imidacloprid) + Orchex 796	8.0 fl oz + 1 % v/v	49.0 a	12.0 bc (83)	3.2 a (64)
Untreated	-	47.8 a	67.5 a (0)	8.6 a (0)

Data from AMT Vol 27:A5. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on Waller-Duncan k-ratio t-test (k-ratio =100)
[z] Number of WAA per colony.
[x] Henderson's percent control was calculated on the number of WAA per colony.

In 2002, Wise conducted a laboratory bioassay and a field trial to determine efficacy of several insecticides applied foliar for the control of wooly apple aphids (*Eriosoma lanigerum*) on apple (*Malus domestica).* All treatments in the laboratory bioassay (Table 34) provided significant levels of WAA control compared to the untreated check. The data clearly show that Provado, Actara, and Thiodan are all highly lethal to WAA, and AzaDirect is moderately lethal. The moderate level of mortality given by Provado in the on-farm trial suggests that 100 gpa may not have given sufficient canopy penetration to provide the highest levels of control. Thiodan, on the other hand, performed very well even with less than dilute spray coverage. AzaDirect also appeared to maintain its moderate performance level under these field conditions.

Table 34. Efficacy on Wooly Apple Aphids (*Eriosoma lanigerum)* on Apple (*Malus domestica),* Wise, MI, 2002.

Treatment (Active Ingredient)	Rate Per Acre	% WAA Mortality[y]	
		Bioassay 6 DAT	On-farm Trial 10 DAT
Actara 25 WG (thiamethoxam)	4.5 oz	100 c	-
Aza-Direct 0.099L (azadirachtin)	32 fl oz	48.6 b	53.5 bc
Provado 1.6F (imidacloprid)	8.0 fl oz	100 c	58.5 bc
Thiodan 50WP	5 lb	100 c	82.0 c
Untreated	-	3.3 a	0.0 a

Data from AMT Vol 28: A24. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on LSD (P = 0.05).

In 2009, Beers conducted two trials to determine efficacy of several insecticides applied foliar with Saf-T-Side oil, except Diazinon, for the control of high infestations of wooly apple aphids (*Eriosoma lanigerum*) on apple (*Malus domestica).* In the first trial, all treatments, except Ultor, were applied once on Sept 1; Ultor was applied Sept 1 and Sept 18. In the second trial, treatments were applied once on Aug 24. Results of the first trial showed that only the standard Diazinon provided excellent control, with few

or no live aphids found starting one week after treatment; all other products provided poor control (Table 35). Similarly, Diazinon provided excellent control in the second trial as evidenced by colony counts and live aphids, while the other products provided poor control (Table 36).

In 2011, Beers conducted a trial to determine efficacy of several insecticides applied foliar at insect threshold (July 20) for the control of wooly apple aphids (*Eriosoma lanigerum),* on apple (*Malus domestica)*. Both Sulfoxaflor andWarrior provided equal performance compared to the standard, diazinon (Table 37).

Table 35. Efficacy on Wooly Apple Aphids (*Eriosoma lanigerum)* on Apple (*Malus domestica)*, Trial 1, Beers, WA, 2009.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Henderson's Percent Control [x]						
		8/31 (Pre)	9/4	9/7	9/11	9/17	9/28	10/6
WAA colonies/1.5 min Count								
Actara 25 WG (thiamethoxam)	5.5 oz	238 bc	86 abc (21)	90 cd (57)	73 d (61)	126 de (50)	251 bc (11)	281abc (9)
Assail 70WP (acetamiprid)	3.4 oz	249 abc	79 c (31)	85 cd (61)	89 d (54)	135 cde (49)	250 bc (16)	283abc (12)
Diazinon 50W (diazinon)	4 lb	232 c	87 bc (18)	71 d (65)	73 d (60)	16 f (94)	46 d (83)	32 d (89)
NNI-0101 20% SC (pyrifluquinazon)	6.4 fl oz	271 ab	180 a (0)	145 bc (39)	168 bc (21)	208 bc (28)	310 ab (4)	343ab (2)
	12.7 fl oz	266 abc	87 bc (29)	184 ab (21)	153 c (27)	223 ab (21)	286 ab (10)	343ab (0)
Ultor 1.25L (spirotetramat)	10 fl oz	246 abc	159 ab (0)	165 b (23)	211 ab (0)	179 bcd (32)	257 abc (12)	264abc (17)
	14 fl oz	270 ab	164 a (0)	153 bc (35)	202 ab (4)	216 ab (25)	260 abc (19)	250bc (28)
Untreated	-	277 a	127 abc (0)	242 a (0)	217 a (0)	295 a (0)	330 a (0)	358a (0)
Live WAA/colony								
Actara 25 WG (thiamethoxam)	5.5 oz	51 b	9 ab (4)	15 c (0)	11 de (49)	54 c (7)	53 c (24)	35 e (30)
Assail 70WP (acetamiprid)	3.4 oz	47 b	7 b (50)	8 bc (42)	29 a-d (0)	72 bc (0)	54 c (16)	42 de (9)
Diazinon 50W (diazinon)	4 lb	39 b	14 ab (0)	0 d (100)	0 e (100)	0 d (100)	5 d (91)	5 f (87)
NNI-0101 20% SC (pyrifluquinazon)	6.37 fl oz	45 b	16 ab (0)	25 ab (0)	24 bcd (0)	136 a (0)	100 b (0)	74 ab (0)
	12.74 fl oz	51 b	18 ab (0)	21 abc 0()	30 a-d (0)	105 ab (0)	128 ab (0)	67 bc (0)
Ultor 1.25L (spirotetramat)	10 fl oz	55 ab	29 ab (0)	21 abc (0)	47 a (0)	72 bc (0)	70 c (7)	51 cd (5)
	14 fl oz	69 ab	31 ab (0)	23 ab (0)	36 abc (0)	77 bc (2)	144 a (0)	53 bcd (22)
Untreated	-	105 a	31 a (0)	31 a (0)	44 ab (0)	120 a (0)	144 a (0)	103 a (0)

Data from AMT Vol 35: A2. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Waller-Duncan k-ratio t-test (k-ratio = 100).

[z] Number of WAA colonies/1.5 min count and live WAA per colony.

[x] Henderson's percent control was calculated on the number of WAA colonies/1.5 min count and live WAA per colony.

Table 36. Efficacy on Wooly Apple Aphids (*Eriosoma lanigerum)* on Apple (*Malus domestica)*, Trial 2, Beers, WA, 2009.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Henderson's Percent Control [x]							
		8/21 (Pre)	8/31	9/4	9/10	9/16	9/24	10/2	10/7
WAA colonies/1.5 min Count									
Diazinon 50W	4 lb	205 a	207 a (3)	261 a (3)	205 a (3)	2 e (99)	31 c (88)	33 c (88)	44 c (86)
NNI-0101 20% SC (pyrifluquinazon)	6.4 fl oz	186 a	194 a (0)	228 ab (7)	174 a (10)	180 ab (2)	189 b (11)	233 ab (6)	244 a (17)
	12.7 fl oz	160 a	157 a (6)	145 b (31)	38 bc (77)	61 de (61)	168 b (8)	106 b (77)	130 b (49)
Ultor 1.25L (spirotetramat)	10 fl oz	194 a	177 a (13)	153 b (40)	124 ab (38)	127 bc (34)	242 ab (0)	295 a (0)	307 a (0)
	14 fl oz	188 a	313 a (0)	292 a (0)	67 bc (66)	84 cd (55)	304 a (0)	297 a (0)	316 a (0)
Untreated	-	198 a	207 a (0)	261 a (0)	205 a (0)	196 a (0)	225 ab (0)	265 a (0)	314 a (0)
Live WAA/colony									
Diazinon 50W (diazinon)	4 lb	72 d	1 b (99)	0 c (100)	8 b (93)	0 c (100)	3 b (98)	4 b (95)	2 b (98)
NNI-0101 20% SC (pyrifluquinazon)	6.37 fl oz	67 d	8 b (90)	113 d (0)	74 d (27)	37 b (58)	146 d (15)	93 d (0)	90 d (0)
	12.74 fl oz	68 d	90 d (0)	69 b (29)	37 b (64)	59 db (34)	123 d (30)	69 d (5)	80 d (3)
Ultor 1.25L (spirotetramat)	10 fl oz	90 d	51 d (55)	66 b (49)	77 d (44)	98 d (18)	72 d (69)	100 d (0)	82 d (25)
	14 fl oz	83 d	97 d (7)	60 b (49)	22 b (83)	62 db (43)	88 d (59)	85 d (4)	84 d (17)
Untreated	-	56 d	70 d (0)	80 db (0)	85 d (0)	74 d (0)	144 d (0)	60 d (0)	68 d (0)

Data from AMT Vol 35: A3.

[y] Means followed by same letter do not differ significantly based on Waller-Duncan k-ratio t-test (k-ratio =100).

[z] Number of WAA colonies/1.5 min count and live WAA per colony.

[x] Henderson's percent control was calculated on the number of WAA colonies/1.5 min count and live WAA per colony.

Table 37. Efficacy on Wooly Apple Aphids (*Eriosoma lanigerum*) on Apple (*Malus domestica*), Beers, WA, 2011.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts, Means Separations [y], and Henderson's Percent Control [x]							
		7/13 (Pre)	7/27	8/10	8/24	9/7	9/21	10/6	11/3
Diazinon 50W (diazinon)	4 lb	12.25 a	7.00 cde (85)	4.00 de (89)	6.25 c (84)	5.50 cd (74)	6.25 de (56)	3.25 cd (71)	8.25 efg (8)
Sulfoxaflor 240SC (sulfoxaflor)	4.3 fl oz	13.25 a	17.25 cde (57)	20.75 cde (48)	13.50 c (67)	8.50 cd (72)	1.50 e (90)	0.25 d (98)	6.50 gf (33)
	5.7 fl oz	20.25 a	32.25 a-e (57)	15.00 cde (75)	9.50 c (85)	9.50 cd (73)	4.75 e (80)	3.00 cd (84)	8.75 efg (41)
Warrior II (lambda-cyhalothrin)	2.6 fl oz	11.75 a	19.25 cde (56)	9.75 cde (72)	10.50 c (71)	8.25 cd (60)	6.75 de (51)	2.25 cd (79)	3.00 g (65)
Untreated	-	17.50 a	64.75 a (0)	52.50 ab (0)	54.25 a (0)	30.50 b (0)	20.50 bcd (0)	16.25 bc (0)	12.75 efg (0)

Data from AMT Vol 37: A1. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Waller-Duncan k-ratio t-test (P = 0.05).

[z] Number of WAA colonies/1 min count.

[x] Henderson's percent control was calculated on the number of WAA colonies/1 min count.

In 2011, Van Steenwyk conducted a trial to determine efficacy of the experimental insecticide HGW86 10SE applied foliar on May 28 and Sept 1 for the control of wooly apple aphids (*Eriosoma lanigerum),* on apple (*Malus domestica)*. Diazinon 50W and both rates of Movento 2SC provided excellent control of WAA with a lag time of three to four weeks for the full effect of the insecticides to become apparent (Table 38). HGW86 10SE at the three rates of application did not provide adequate control of WAA.

Table 38. Efficacy on Wooly Apple Aphids (*Eriosoma lanigerum)* on Apple (*Malus domestica)*, Van Steenwyk, CA, 2011.

Treatment (Active Ingredient)	Rate Per Acre	Infestation Rating [z] and Means Separations [y]				
		6/9	6/23	7/7	8/22	9/16
Diazinon 50W* (diazinon)	32.0 oz	0.5 a	0.8 a	0.0 a	1.0 ab	0.3 a
HGW86 10SE (cyantraniliprole)	10.1 fl oz	1.5 a	2.0 ab	3.5 b	1.8 bc	1.3 ab
	13.5 fl oz	1.8 a	3.3 bc	5.0 b	2.0 bc	2.5 ab
	20.5 fl oz	2.0 a	3.5 bc	4.3 b	2.3 c	2.8 ab
Movento 2SC (spirotetramat)*	6.0 fl oz	1.5 a	1.3 a	0.0 a	0.5 a	0.5 a
	9.0 fl oz	0.8 a	0.3 a	0.0 a	0.5 a	0.3 a
Untreated	-	2.5 a	4.0 c	3.8 b	1.0 ab	3.0 b

Data from AMT Vol 37: A11.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Scale of 0-6 where 0 = No visible WAA colonies, 1 = Few colonies, difficult to locate, low in the tree, 2 = Colonies low density, easy to locate, low in the tree, 3 = Colonies moderate density, easy to locate, low in the tree, 4 = Colonies moderate density, easy to locate throughout the tree and not in fruit, 5 = Colonies moderate density, easy to locate throughout the tree and in fruit, 6 = Colonies high density, observed throughout the tree and in fruit.

* Treatments mixed with Dyne-Amic at 0.25% v/v

In 2012, Reissig conducted a trial to determine efficacy of several insecticides applied foliar with LI-700 at insect threshold (July 25), except Movento which was applied July 25 and Aug 13, for the control of wooly apple aphids (*Eriosoma lanigerum),* on apple (*Malus domestica)*. Closer provided excellent performance comparable to the standard Diazinon, while Movento was less effective (Table 39). This may be due to the systemic activity of Movento and the time of year applied, when the tree was likely not able to absorb the product very well due to hardening leaf surfaces.

Table 39. Efficacy on Wooly Apple Aphids (*Eriosoma lanigerum*) on Apple (*Malus domestica*), Reissig, NY, 2012.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Henderson's Percent Control [x]					
		7/24 (Pre)	7/30	8/7	8/13	8/21	8/27
Closer 240SC (sulfoxaflor)	3.0 fl oz	40.8 b	9.2 bc (72)	2.0 bc (88)	0.0 c (100)	0.2 b (99)	0.0 b (100)
	4.0 fl oz	31.8 b	6.2 bc (76)	0.8 c (94)	0.0 c (100)	0.0 b (100)	0.8 b (75)
Diazinon 50W (diazinon)	2 lb	52.0 ab	1.5 c (96)	0.5 c (98)	0.0 c (100)	0.0 b (100)	0.0 b (100)
Movento (spirotetramat)	9.0 fl oz	57.5 ab	17.8 b (62)	8.8 b (64)	3.2 b (54)	3.0 b (87)	1.0 b (82)
Untreated	-	72.5 a	58.8a (0)	30.5a (0)	9.8 a (0)	29.0 a (0)	7.2 a (0)

Data from AMT Vol 38: A12. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Student's t-test (P = 0.05).

[z] % WAA infested terminals.

[x] Henderson's percent control was calculated on % WAA infested terminals.

In 2012, Van Steenwyk conducted a trial to determine efficacy of Closer and Movento applied foliar on June 8 and July 31 for the control of wooly apple aphids (*Eriosoma lanigerum),* on apple (*Malus domestica)*. Both treatments significantly reduced WAA population infestation (Table 40). Closer at 8 fl oz/A had significantly lower infestation than the other rates and Movento.

Table 40. Efficacy on Wooly Apple Aphids (*Eriosoma lanigerum)* on Apple (*Malus domestica)*, Van Steenwyk, CA, 2012.

Treatment (Active Ingredient)	Rate Per Acre	Infestation Rating [z] and Means Separations [y]						
		6/6 (Pre)	6/12	6/20	6/26	7/2	7/10	7/19
Closer 2SC (sulfoxaflor)	3 fl oz	0.9 a	1.9 a	1.9 ab	2.1 bc	1.8 bc	2.1 a	1.8 a
	6 fl oz	1.5 a	1.2 a	1.6 ab	1.3 a	2.3 c	1.9 a	1.7 a
	8 fl oz	1.3 a	1.4 a	1.3 a	1.6 ab	1.1 a	1.9 a	1.3 a
Movento 2SC (spirotetramat)	9 fl oz	1.3 a	1.9 a	1.8 ab	2.0 ab	1.1 ab	2.2 a	1.6 a
Untreated	-	1.0 a	2.1 a	2.4 b	2.9 c	3.1 d	3.4 b	2.8 b
Treatment	**Rate**	**7/24**	**7/31**	**8/7**	**8/16**	**8/21**	**9/7**	**Season Ave**
Closer 2SC(sulfoxaflor)	3 fl oz	2.3 a	2.4 a	2.5 a	2.8 ab	2.9 b	2.8 b	2.2b
	6 fl oz	2.2 a	2.8 a	2.4 a	3.2 bc	3.2 b	2.6 b	2.1b
	8 fl oz	2.5 a	2.0 a	2.1 a	2.1 a	2.1 a	1.8 a	1.7a
Movento 2SC (spirotetramat)	9 fl oz	1.7 a	2.2 a	2.4 a	2.9 b	2.8 b	2.6 b	2.0b
Untreated	-	3.0 a	3.7 b	3.9 b	3.8 c	4.1 c	4.0 c	3.1c

Data from AMT Vol 38: A13.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Scale of 0-6 where 0 = No visible WAA colonies, 1 = Few colonies, difficult to locate, low in the tree, 2 = Colonies low density, easy to locate, low in the tree, 3 = Colonies moderate density, easy to locate, low in the tree, 4 = Colonies moderate density, easy to locate throughout the tree and not in fruit, 5 = Colonies moderate density, easy to locate throughout the tree and in fruit, 6 = Colonies high density, observed throughout the tree and in fruit.

* Treatments mixed with Dyne-Amic at 0.0625% v/v

In 2013, Reissig conducted a trial to determine efficacy of compare the efficacy of insecticides that are currently recommended for the control of wooly apple aphids (*Eriosoma lanigerum),* on apple (*Malus domestica)*. Movento and Sivanto were mixed with LI-700. Movento was applied On July 3 as it is generally more effective when applied on younger leaves. Sivanto and the standard Diaznon were applied on July 9 when infestation levels reached approximately 30% infested terminals in all plots. A single application of all treatments provided 100% control of wooly apple aphids by July 29 (Table 41).

Table 41. Efficacy on Wooly Apple Aphids (*Eriosoma lanigerum*) on Apple (*Malus domestica*), Reissig, NY, 2013.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Henderson's Percent Control [x]					
		7/3	7/9	7/17	7/23	7/29	8/12
Sivanto SC (flupyradiflurone)	14 fl oz	23.3 a	55.3 a	3.7 b (85)	3.3 a (28)	0.0 b (100)	0.0 b (100)
Movento (spirotetramat)	9 fl oz	19.0 a	28.7 a	2.3 b (91)	0.7 b (85)	0.0 b (100)	0.0 b (100)
Diazinon 50W (diazinon)	2 lb	23.6 a	58.3 a	0.7 b (97)	0.7 b (85)	0.0 b (100)	0.0 b (100)
Untreated	-	24.3 a	44.7 ab	24.6 a (0)	4.6 a (0)	3.0 a (0)	1.0 a (0)

Data from AMT Vol 39: A9.

[y] Means followed by same letter do not differ significantly based on Student's t-test (P = 0.05).

[z] % WAA infested terminals.

[x] Percent control was calculated on % WAA infested terminals.

Comparative Efficacy on Lipaphis spp.

In 2000, McLeod conducted a trial to determine efficacy of several insecticides applied foliar with Thoroughbred surfactant at 0.25% on May 2 for the control of turnip aphids (*Lipaphis erysimi),* on turnip (*Brassica rapa).* All treatments provided excellent control of a high turnip aphid infestation 3 days post-application (Table 42).

In 2007, Neussly conducted a trial to to compare recently labeled products against earlier labeled products that have become standards for the control of turnip aphids (*Lipaphis pseudobrassicae*) on Chinese cabbage (*Brassica rapa* ssp. *pekinensis).* Insecticides were applied foliar with AD-Spray 90 adjuvant at 0.25% on April 2, 10, 19, and 25. Aphid densities across the experiment plots had risen to > 30 per plant (> 3 aphid rating) by the first treatment date. Grower practice would have been to treat for aphids before they reached 10 per plant. Movento and Pasada treatments reduced the mean aphid rating below 2 within 7 DAT. Mean aphid density at harvest were all below 20 per plant in Fulfill, Movento, Pasada and Assail treatment plots (Table 43). Mean aphid counts in the Beleaf plots at harvest were slightly higher than 20 per plant at harvest. Counts in untreated plots averaged lower than 30 per plant due to the rapidly degrading habitat left by large numbers of diamondback larvae (> 200 plant) in those plots.

Table 42. Efficacy on Turnip Aphids (*Lipaphis erysimi)* on Turnip (*Brassica rapa)*, McLeod, AR, 2000.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z] and Means Separations [y]
Actara 25 WG (thiamethoxam)	3.0 oz	0.1 a
Provado 1.6F (imidacloprid)	3.8 fl oz	0.4 a
Warrior 1CS (lambda-cyhalothrin)	3.9 fl oz	0.0 a
Untreated	-	4.8 c

Data from AMT Vol 26: E103. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).
[z] Rating on the number of aphids per plant on a scale of 0-5 where 0 = 0, 1 = 1-25, 2 = 26-50, 3 = 51-100, 4 = 101-250, and 5 = > 250.

Table 43. Efficacy on Turnip Aphids (*Lipaphis pseudobrassicae)* on Chinese Cabbage (*Brassica rapa* ssp. *pekinensis)*, Neussly, FL 2007.

		Population Counts [z] and Means Separations [y]		
Treatment (Active Ingredient)	Rate/A	3/31 (Pre)	4/7 (5 DAT)	5/1-4 (Harvest)
Assail 30SG (acetamiprid)	3.0 oz	3.8 bcd	2.3 b	1.5 c
Beleaf 50SG (flonicamid)	2.8 oz	3.9 d	2.7 c	2.2 d
Discipline 2EC (bifenthrin)	6.4 fl oz	3.9 cd	2.9 cd	4.0 f
Fulfill 50WDG (pymetrozine)	2.75 oz	3.7 a-d	3.5 f	1.1 a
Movento 2SC (spirotetramat)	5.0 fl oz	3.5 a	1.9 a	1.3 bc
	8.0 fl oz	3.9 cd	1.8 a	1.4 ab
Pasada 1.6F (imidacloprid)	3.8 fl oz	3.4 a	1.8 a	1.3 abc
Untreated	-	3.6 ab	3.3 ef	2.6 e

Data from AMT Vol 34: E13. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on ls means, t-test, $p \leq 0.05$).
[z] Rating on the number of aphids per plant on a scale of 0-5 where 0 = 0, 1 = 1-9, 2 = 10-19, 3 = 20-29, 4 = 30 or higher.

Comparative Efficacy on Macrosiphum euphorbia

In 2001, Kuhar conducted a trial to determine efficacy of several insecticides applied foliar on Sept 19 for the control of potato aphids (*Macrosiphum euphorbia*) on tomatoes (*Lycopersicon esculentum*). Actara and Provado provided excellent control of a heavy aphid infestation, while Fulfill was mediocre (Table 44).

In 2002, Radcliffe conducted a trial to determine efficacy of several insecticides applied foliar on Aug 24 for the control of aphids, including potato aphids (*Macrosiphum euphorbia*), on potatoes (*Solanum tuberosum*). All products, except Dinotefuran, provided excellent control of an extremely high aphid infestation; Dinotefuran provided no control (Table 45).

Table 44. Efficacy on Potato Aphids (*Macrosiphum euphorbia*) on Tomatoes (*Lycopersicon esculentum*), Kuhar, VA, 2001.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]	
		7 DAT	14 DAT
Actara 25WG (thiamethoxam)	5.8 oz	0.17 c (100)	0.50 b (99)
	11.5 oz	0.17 c (100)	1.33 b (97)
Fulfill 50WG (pymetrozine)	2.9 oz	22.83 b (74)	16.83 b (58)
Provado 1.6F (imidacloprid)	4 fl oz	0.50 c (99)	1.50 b (96)
Untreated	-	89.00 a (0)	39.83 a (0)

Data from AMT Vol 27: E91.
[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).
[z] Number of aphids per 10 compound leaves.
[x] Percent control was calculated on the number of aphids per 10 compound leaves.

Table 45. Efficacy on Potato Aphids (*Macrosiphum euphorbia*) on Potatoes (*Solanum tuberosum*), Radcliffe, MN, 2002.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]	
		3 DAT	6 DAT
Actara 25WG (thiamethoxam)	1.5 oz	47 c (87)	4 bc (97)
	3.0 oz	23 c (94)	2 c (99)
Dinotefuran 20SG (dinotefuran)*	5.3 oz	320 a (10)	165 a (0)
	7.0 oz	279 ab (22)	162 a(0)
Fulfill 50WG (pymetrozine)*	2.75 oz	99 bc (72)	15 bc (90)
Provado 1.6F (imidacloprid)	3.75 fl oz	75 bc (79)	7 bc (95)
Untreated	-	356 a (0)	151 ab (0)

Data from AMT Vol 27: E91. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on the Ryan-Einot-Gabriel-Welsch Multiple Range Test (P=0.05).
[z] Number of aphids per 35 leaves.
[x] Percent control was calculated on the number of aphids per 35 leaves.
*Tank-mixed with DyneAmic at 3 pt/100 gal.

In 2002, Alyokhin conducted two trials to determine efficacy of several insecticides applied as foliar or soil treatments for the control of aphids, including potato aphids (*Macrosiphum euphorbia*), on potatoes (*Solanum tuberosum*). In the first trial, products were applied foliar on Jul 24 and Aug 15. After one application, Actara provided excellent control of an extremely high aphid infestation; Provado was less effective (Table 46). In the second trial, systemic treatments controlled aphid populations through the

middle of August and the Actara foliar treatment provided excellent control through the duration of trial (Table 47).

Table 46. Efficacy on Potato Aphids (*Macrosiphum euphorbia*) on Potatoes (*Solanum tuberosum*), Trial 1, Alyokhin, ME, 2002.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]				
		7/23 (Pre)	7/30	8/6	8/14	8/20
Actara 25WG (thiamethoxam)	3.0	29.2 ab	4.6 a (92)	4.4 a (99)	59.6 b (92)	3.0 a (93)
Provado 1.6F (imidacloprid)	3.75 fl oz	23.0 ab	14.0 b (71)	12.2 abc (95)	120.0 bcd (79)	12.6 bc (63)
Untreated	-	29.6 ab	62.0 cd (0)	346.6 d (0)	740.6 e (0)	44.4 d (0)

Data from AMT Vol 28: E62. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).

[z] Number of aphids per 20 plants.

[x] Percent control was calculated on the number of aphids per 20 plants.

Table 47. Efficacy on Potato Aphids (*Macrosiphum euphorbia*) on Potatoes (*Solanum tuberosum*), Trial 2, Alyokhin, ME, 2002.

Treatment* (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]						
		7/8	7/18	7/25	8/1	8/8	8/15	8/21
Actara 25WG (thiamethoxam)	1.5 oz	-	-	12.6 c	1.0 b (100)	0.4 a (100)	41.8 c (97)	1.8 a (97)
Admire 2F (imidacloprid)	9.5 fl oz	0.0 a (100)	0.0 a (100)	0.0 a (100)	0.2 ab (100)	0.0 a (100)	9.0 a (97)	9.0 c (48)
	12.5 fl oz	0.0 a (100)	0.0 a (100)	0.0 a (100)	0.0 a (100)	0.6 a (100)	6.2 b (98)	15.8 cd (8)
Platinum 2SC (thiamethoxam)	4.5 fl oz	0.0 a (100)	0.0 a (100)	0.0 a (100)	0.0 a (100)	1.0 a (99)	6.2 ab (98)	4.8 abc (72)
	6 fl oz	0.0 a (100)	0.0 a (100)	0.0 a (100)	0.0 a (100)	1.0 a (99)	3.0 a (99)	3.4 ab (80)
Untreated	-	2.8 c ()	4.4 b (0)	3.4 b (0)	89.6 c (0)	127.4 b (0)	355.6 d (0)	17.2 d (0)

Data from AMT Vol 28: E62. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).

[z] Number of aphids per 20 plants.

[x] Percent control was calculated on the number of aphids per 20 plants.

*Actara applied foliar on 7/25 and 8/15. Admire and Platinum applied as soil treatments at planting on 6/3.

In 2002, Kuhar conducted a trial to determine efficacy of several insecticides applied foliar on Oct 2 for the control of potato aphids (*Macrosiphum euphorbia*) on tomatoes (*Lycopersicon esculentum*). Provado provided excellent control of a heavy aphid infestation, Actara was fair, and the other products were poor (Table 48).

Table 48. Efficacy on Potato Aphids (*Macrosiphum euphorbia*) on Tomatoes (*Lycopersicon esculentum*), Kuhar, VA, 2002.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]	
		7 DAT	11 DAT
Actara 25WG (thiamethoxam)	2 oz	36.8 cd (84)	153.3 bcd (71)
Assail 70WP (acetamiprid)	1.14 oz	85.8 bcd (64)	272.8 a-d (49)
Aza-Direct (azadirachtin)	16 fl oz	218.8 ab (7)	286.8 abc (46)
	24 fl oz	170.5 abc (28)	389.8 ab (27)
	32 fl oz	92.0 b-d (61)	162.8 bcd (69)
Dinotefuran 20SG (dinotefuran)	8 oz	146.2 a-d (38)	263 bcd (51)
Provado 1.6F (imidacloprid)	3.6 fl oz	0.00 d (100)	17.5 d (97)
Trilogy (neem oil)	32 fl oz	279.0 a (0)	335.8 ab (36)
Untreated	-	236.0 ab (0)	531.8 a (0)

Data from AMT Vol 28: E77. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).
[z] Number of aphids per 10 compound leaves.
[x] Percent control was calculated on the number of aphids per 10 compound leaves.

In 2004, Radcliffe conducted a field trial to determine efficacy of several insecticides applied foliar on Aug 24 for the control of aphids, including potato aphids (*Macrosiphum euphorbia*), on potatoes (*Solanum tuberosum*). All products provided good to excellent control of a very high aphid infestation (Table 49). F1785 and Fulfill cause aphids to cease feeding. This is reported to happen very rapidly and to be irreversible. Thus, although the aphids remained alive on the plants after treatment with these products, no further feeding occurred.

Table 49. Efficacy on Potato Aphids (*Macrosiphum euphorbia*) on Potatoes (*Solanum tuberosum*), Radcliffe, MN, 2004.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		3 DAT	7 DAT	13 DAT
Actara 25WG (thiamethoxam)	3.0 oz	13 b (92)	14 b (93)	51 cd (86)
F-1785 50WP (flonicamid)	1.1 oz	37 b (78)	32 b (83)	36 cd (90)
	1.4 oz	27 b (84)	37 b (77)	14 d (96)
Fulfill 50WG (pymetrozine)*	2.75 oz	51 b (70)	68 b (74)	62 cd (84)
Untreated	-	168 a (0)	233 a (0)	376 bc (0)

Data from AMT Vol 30: E58. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on the Ryan-Einot-Gabriel-Welsch Multiple Range Test (P=0.05).
[z] Number of aphids per 35 leaves.
[x] Percent control was calculated on the number of aphids per 35 leaves.
*Tank-mixed with DyneAmic at 3 pt/100 gal.

In 2009, Kuhar conducted two trials to determine efficacy of soil and foliar insecticides for the control of potato aphids (*Macrosiphum euphorbia*) on tomatoes (*Lycopersicon esculentum*). In the first trial, products were applied as drench treatments on Sep 1, and foliar treatments on Sep 7 and 15. All products provided excellent control of a moderate aphid infestation (Table 50). In the second trial, all treatments were applied foliar for control of lepidopteran pests and potato aphids on Aug 19, 25, Sep 1, 8 and 15. HGW86 provided excellent control of a moderate potato aphid infestation (Table 51).

Table 50. Efficacy on Potato Aphids (*Macrosiphum euphorbia*) on Tomatoes (*Lycopersicon esculentum*), Trial 1, Kuhar, VA, 2009.

Treatment (Active Ingredient)	Rate Per Acre	Application Method*	Population Counts [z], Means Separations [y], and Percent Control [x]	
			9/11	9/17
Admire Pro (imidacloprid)	10.5 fl oz	Drench	0.5 b (99)	1.5 c (96)
HGW86 20SC (cyantraniliprole)	6.8 fl oz	Drench	0.5 b (99)	18.8 bc (55)
	10.3 fl oz	Drench	1.8 b (96)	9.0 bc (78)
Movento 2SC (spirotetramat)	4.0 fl oz	Foliar	28.5 ab (42)	3.8 c (91)
Platinum 75SG (thiamethoxam)	2.7 oz	Drench	0.3 b (99)	5.5 c (87)
Provado 1.6F (imidacloprid)	6.2 fl oz	Foliar	1.3 b (97)	0.0 c (100)
Untreated	-	-	48.8 a (0)	41.5 a (0)

Data from AMT Vol 35: E38. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).
[z] Number of aphids per 10 compound leaves.
[x] Percent control was calculated on the number of aphids per 10 compound leaves.
* Drench treatments were applied on Sep 1, and foliar treatments on Sep 7 and 15.

Table 51. Efficacy on Potato Aphids (*Macrosiphum euphorbia*) on Tomatoes (*Lycopersicon esculentum*), Trial 2, Kuhar, VA, 2009.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]
		9/11
HGW86 20SC (cyantraniliprole)	6.8 fl oz	2.0 c (95)
	10.1 fl oz	1.0 c (98)
	13.5 fl oz	2.0 c (95)
	20.5 fl oz	0.3 c (99)
Untreated	-	40.3 abc (0)

Data from AMT Vol 35: E38. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).
[z] Number of aphids per 20 leaves.
[x] Percent control was calculated on the number of aphids per 20 leaves.

Comparative Efficacy on Myzus persicae

In 1999, Edelson conducted a trial to determine efficacy of several insecticides applied foliar on Nov 4 for the control of green peach aphids (*Myzus persicae*) on turnip (*Brassicae rapa*). Acetamiprid, Lambda Cyhalothrin and Provado provided excellent control of a moderate aphid infestation, Thiamethoxam and Fulfill were less effective, and Neemix was ineffective (Table 52).

Table 52. Efficacy on Green Peach Aphids (*Myzus persicae*) on Turnip (*Brasicae rapa*), Edelson, OK, 1999.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]	
		7 DAT	14 DAT
Acetamiprid	0.075 lb ai	14 bc (93)	1 e (100)
Fulfill 25WG (pymetrozine)	2.8 oz prod	60 abc (68)	46 cde (89)
Lambda Cyhalothrin	0.03 lb ai	24 bc (97)	34 de (92)
Neemix 4.5 (azadirachtin)	16 fl oz	218 a (0)	267 ab (35)
Provado 1.6F (imidacloprid)	3.8 fl oz	3 c (98)	2 e (100)
Thiamethoxam	0.02 lb ai	17 bc (91)	66 bcd (84)
Untreated	-	189 a (0)	413 a (0)

Data from AMT Vol 26: E98. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on LSD (P=0.10).
[z] Number of aphids per 3 plants.
[x] Percent control was calculated on the number of aphids per 3 plants.

In 2000, Radcliffe conducted a trial to determine efficacy of several insecticides applied foliar on Aug 9 for the control of green peach aphids (*Myzus persicae*), on potatoes (*Solanum tuberosum*). All products provided excellent control of an extremely high aphid infestation (Table 53).

Table 53. Efficacy on Green Peach Aphids (*Myzus persicae*), on Potatoes (*Solanum tuberosum*), Radcliffe, MN, 2000.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]				
		8/7 (Pre)	2 DAT	5 DAT	9 DAT	14 DAT
Actara 25WG (thiamethoxam)	1.5 oz	5,085 a	4,155 ab (58)	302 bc (98)	2 bc (100)	0 c (100)
	3.0 oz	6,154 a	1,911 ab (84)	31 bc (100)	0 bc (100)	0 c (100)
Fulfill 50WG (pymetrozine)*	1.4 oz	7,411 a	5,621 ab (61)	722 b (97)	5 b (100)	0 c (100)
	2.9 oz	5,863 a	6,167 ab (46)	330 bc (99)	2 bc (100)	0 c (100)
Provado 1.6F (imidacloprid)	1.9 fl oz	4,692 a	4,309 ab (53)	231 bc (99)	18 bc (100)	31 bc (99)
	3.8 fl oz	5,015 a	1,375 b (86)	97 bc (99)	2 bc (100)	6 bc (100)
Untreated	-	4,612 a	9,007 a (0)	17,389 a (0)	10,665 (0)a	4,974 a (0)

Data from AMT Vol 26: E56. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on the Ryan-Einot-Gabriel-Welsch Multiple Range Test (P=0.05).
[z] Number of aphids per 35 leaves.
[x] Henderson's percent control was calculated on the number of aphids per 35 leaves.
*Tank-mixed with DyneAmic at 3 pt/100 gal.

In 2001, Palumbo conducted a trial to determine efficacy of reduced-risk botanical and biological insecticides applied as foliar or soil treatments for control of green peach aphids (*Myzus persicae*) on spinach (*Spinacia oleracia).* Admire and Platinum soil treatments were applied on Feb 6 following plant emergence, and foliar treatments applied on Feb 14 and 21. Adjuvants were added to the foliar treatments.

The foliar treatments Actara and Provado provided the most significant aphid control; the soil treatments Admire and Platinum were inferior (Table 54).

Table 54. Efficacy on Green Peach Aphids (*Myzus persicae)* on Spinach (*Spinacia oleracia*), Palumbo, AZ, 2001.

Treatment (Active Ingredient)	Rate Per Acre	Application Method	Population Counts [z], Means Separations [y], and Percent Control [x]		
			2/6	2/21	3/7
Actara 25WG (thiamethoxam)	3.0 oz	Foliar	1.1 a	2.1 e (83)	2.0 h (94)
Admire 2F (imidacloprid)	16 fl oz	Soil band	0.4 a	3.1 e (74)	10.4 gh (68)
Aza-Direct EC (azadirachtin)	24 fl oz	Foliar	0.8 a	7.3 bcd (39)	15.5 e-h (52)
Fulfill 50WG (pymetrozine)	2.8 oz	Foliar	0.7 a	8.0 bcd (33)	15.7 e-h (52)
Platinum 2SC (thiamethoxam)	9 fl oz	Soil band	1.1 a	2.1 e (83)	12.7 fgh (61)
Provado 1.6F (imidacloprid)	3.8 fl oz	Foliar	0.9 a	1.3 e (89)	3.6 h (89)
Untreated	-	-	0.7 a	12.0 ab (0)	32.4 c-f (0)

Data from AMT Vol 27: E83.
[y] Means followed by same letter do not differ significantly based on Protected LSD F test (P=0.05).
[z] Number of aphids per plant.
[x] Percent control was calculated on the number of aphids per plant.

In 2002, Edelson conducted a field trial to determine efficacy of several insecticides applied foliar on Oct 4 and 14 for the control of green peach aphids (*Myzus persicae*) on collard (*Brassicae oleraceae*). Actara and Flonicamid provided excellent control of a high aphid infestation, while Acetamiprid was less effective (Table 55).

Table 55. Efficacy on Green Peach Aphids (*Myzus persicae*) on Collard (*Brasicae oleraceae*), Edelson, OK, 2002.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		10/1	10/16	10/18
Actara 25WG (thiamethoxam)	4.0 oz	18 b (89)	0.8 c (99)	0.6 b (100)
Acetamiprid 30SG	5.3 oz	36 b (79)	49.0 b (68)	20.0 b (85)
Flonicamid 50DF	2.8 oz	31 b (82)	12.0 bc (92)	2.0 b (99)
Untreated	-	170 a (0)	154.0 a (0)	134.0 a (0)

Data from AMT Vol 28: E19. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on LSD (P=0.10).
[z] Number of aphids per plant.
[x] Percent control was calculated on the number of aphids per plant.

In 2002, Radcliffe conducted a field trial to determine efficacy of several insecticides applied foliar on Aug 24 for the control of aphids, including green peach aphids (*Myzus persicae*), on potatoes (*Solanum tuberosum*). All products, except Dinotefuran, provided excellent control of an extremely high aphid infestation; Dinotefuran provided no control (Table 56).

Table 56. Efficacy on Green Peach Aphids (*Myzus persicae*) on Potatoes (*Solanum tuberosum*), Radcliffe, MN, 2002.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		8/22 (Pre)	3 DAT	6 DAT
Actara 25WG (thiamethoxam)	1.5 oz	412 ab	524 b (72)	80 c (95)
	3.0 oz	322 ab	298 b (86)	18 c (99)
Dinotefuran 20SG (dinotefuran)*	5.3 oz	913 a	3744 a (11)	3157 a (0)
	7.0 oz	691 a	3844 a (0)	3157 a (0)
Fulfill 50WG (pymetrozine)*	2.8 oz	314 b	704 b (51)	55 c (96)
Provado 1.6F (imidacloprid)	3.8 fl oz	740 ab	1139 b (66)	75 c (98)
Untreated	-	454 ab	2083 b (0)	1845 b (0)

Data from AMT Vol 28: E48. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on the Ryan--Einot--Gabriel--Welsch Multiple Range Test (P=0.05).
[z] Number of aphids per 35 leaves.
[x] Percent control was calculated on the number of aphids per 35 leaves.
*Tank-mixed with DyneAmic at 3 pt/100 gal.

In 2004, Palumbo conducted a trial to determine efficacy of several new selective insecticides, compared to older conventional insecticides, applied foliar for control of green peach aphids (*Myzus persicae*) on broccoli (*Brassica oleraceae).* Treatments were applied on Feb 9, 23, and Mar 8. A spreader/sticker, DyneAmic, was applied at 0.010 % v/v with all treatments. Admire at-planting soil application was used as the standard treatment. Assail, TD2472 and Flonicamid provided good control of a high aphid infestation, while Fulfill was generally poor (Table 57). Flonicamid was the only foliar treatment that provided control generally comparable to the standard Admire soil application.

In 2004, Palumbo conducted two trials to determine efficacy of several insecticides for control of green peach aphids (*Myzus persicae*), on lettuce (*Lactuca sativa)*. In the first trial, a total of four spray applications were applied on Jan 13, 27, Feb 19, and Mar 4; first spray was applied when population reached 8 aphids per plant. An adjuvant DyneAmic on the at 0.125% v/v was mixed with all treatments. On the last two applications Capture 2E was combined with the Dimethoate treatment. All products except Dimethoate provided good to excellent control of a moderate green peach aphid pressure (Table 58). Overall, the Assail and Flonicamid treatments provided the most consistent aphid control. In the second trial, a total of three spray applications were applied with DyneAmic on Feb 14, 28, and Mar15, with the first spray applied when population reached 5.2 aphids per plant. Assail and Flonicamid provided good to excellent control, while Fulfill was inferior (Table 59).

Table 57. Efficacy on green peach aphids (*Myzus persicae*) on Broccoli (*Brassica oleraceae*), Palumbo, AZ, 2004.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]					
		2/16	2/23	3/1	3/8	3/17	3/24
Admire 2F (imidacloprid)	20 fl oz	4.2 bc (88)	4.8 d (88)	7.2 b (85)	11.4 e (84)	18.3 c (83)	7.7 d (90)
Assail TD 2472 30SG (acetamiprid)	4.0 oz	3.0 bc (91)	9.1 cd (78)	8.8 b (82)	32.5 cd (53)	34.0 c (68)	42.5 bc (46)
Assail 70W (acetamiprid)	1.7 oz	3.9 bc (88)	10.8 cd (73)	8.3 b (83)	37.5 cd (46)	29.7 c (72)	36.7 bc (53)
Flonicamid 50DF (flonicamid)	2.3 oz	2.0 c (94)	7.5 cd (82)	7.7 b (84)	27.0 de (61)	21.0 c (80)	24.0 cd (65)
Fulfill 50WG (pymetrozine)	2.8 oz	17.5 abc (48)	28.3 bc (30)	21.5 b (56)	57.3 bc (17)	81.7 ab (24)	43.9 bc (44)
Untreated Check	-	33.9 a (0)	40.7 ab (0)	48.5 a (0)	69.3 ab (0)	107.4 a (0)	78.5 a (0)

Data from AMT Vol 30: E7. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).

[z] Number of apterous aphids per plant.

[x] Percent control was calculated on the number of apterous aphids per plant.

Table 58. Efficacy on Green Peach Aphids (*Myzus persicae*) on Lettuce (*Lactuca sativa*), Trial 1, Palumbo, AZ, 2004.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]							
		1/27	2/3	2/10	2/18	2/26	3/3	3/11	Harvest
Assail 70WP (acetamiprid)	1.7 oz	1.7 c (86)	2.5 bc (84)	1.1 d (95)	4.5 cd (91)	2.0 c (97)	3.0 b (97)	0.6 c (99)	0.2 b (99)
Dimethoate 4E (dimethoate)	8 fl oz	15.3 a (0)	12.8 a (17)	15.6 ab (35)	37.9 ab (21)	34.9 b (54)	58.9 a (32)	16.3 b (83)	2.2 b (90)
Flonicamid 50DF (flonicamid)	2.3 oz	2.2 c (82)	1.4 c (91)	1.1 d (95)	7.0 cd (85)	8.6 bc (89)	3.0 b (97)	2.2 c (98)	0.7 b (97)
Fulfill 50WG (pymetrozine)	2.75 oz	5.1 bc (57)	6.7 abc (57)	6.5 cd (73)	14.1 c (71)	20.2 bc (73)	5.3 b (94)	6.6 bc (93)	2.0 b (91)
Provado 1.6F (imidacloprid)	3.8 fl oz	3.8 bc (68)	1.7 c (89)	1.9 d (92)	7.6 cd (84)	5.2 bc (93)	6.7 b (92)	4.6 bc (95)	1.4 b (94)
Untreated Check	-	11.9 ab (0)	15.5 a (0)	24.0 a (0)	48.2 a (0)	75.2 a (0)	86.8 a (0)	97.9 a (0)	23.0 a (0)

Data from AMT Vol 30: E38. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).

[z] Number of apterous aphids per plant from 2/3 to 3/11, and per head at harvest.

[x] Percent control was calculated on the number of apterous aphids.

Table 59. Efficacy on Green Peach Aphids (*Myzus persicae*) on Lettuce (*Lactuca sativa*), Trial 2, Palumbo, AZ, 2004.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]			
		2/20	2/27	3/5	3/15
Assail 70WP (acetamiprid)	1.7 oz	1.9 a (86)	3.3 de (88)	1.7 c (95)	1.7 b (60)
Flonicamid 50DF (flonicamid)	2.3 oz	3.6 a (73)	2.2 e (94)	1.8 c (95)	0.4 b (91)
Fulfill 50WG (pymetrozine)	2.8 oz	9.2 a (31)	22.6 abc (18)	8.8 bc (75)	1.9 b (56)
Untreated Check	-	13.4 a (0)	27.7 a (0)	35.6 a (0)	4.3 a (0)

Data from AMT Vol 30: E41. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).

[z] Number of apterous aphids per plant from 2/3 to 3/11, and per head at harvest.

[x] Percent control was calculated on the number of apterous aphids.

In 2004, Radcliffe conducted a trial to determine efficacy of several insecticides applied foliar on Aug 24 for the control of aphids, including green peach aphids (*Myzus persicae*), on potatoes (*Solanum tuberosum*). Actara and F-1785 provided very good control of a very high aphid infestation (Table 60). F1785 and Fulfill cause aphids to cease feeding. This is reported to happen very rapidly and to be irreversible. Thus, although the aphids remained alive on the plants after treatment with these products, no further feeding occurred.

Table 60. Efficacy on Green Peach Aphids (*Myzus persicae*) on Potatoes (*Solanum tuberosum*), Radcliffe, MN, 2004.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		3 DAT	7 DAT	13 DAT
Actara 25WG (thiamethoxam)	3.0 oz	15 b (94)	13 b (93)	171 c (86)
F-1785 50WP (flonicamid)	1.1 oz	60 b (74)	33 b (83)	95 c (92)
	1.4 oz	46 b (80)	45 b (77)	111 c (91)
Fulfill 50WG (pymetrozine)*	2.8 oz	73 b (69)	51 b (74)	277 c (78)
Untreated	-	232 a (0)	198 a (0)	1254 a (0)

Data from AMT Vol 30: E58. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on the Ryan-Einot-Gabriel-Welsch Multiple Range Test (P=0.05).
[z] Number of aphids per 35 leaves.
[x] Percent control was calculated on the number of aphids per 35 leaves.
*Tank-mixed with DyneAmic at 3 pt/100 gal.

In 2005, Palumbo conducted a trial to determine efficacy of two new active ingredients, flonicamid and acetamiprid, as foliar sprays against industry standards for control of green peach aphids (*Myzus persicae*) on cabbage (*Brassica oleracea* var *capitata)*. Admire soil treatment was applied at direct-seeding on Dec 1; foliar treatments Assail and Flonicamid were applied on Jan 13, 28, Feb 5, and 23. The adjuvant DyneAmic was added to the foliar treatments. The foliar treatments Assail and Flonicamid provided excellent aphid control (Table 61). The soil treatment Admire was inferior; this may be due in part to inadequate absorption and translocation of Admire by cabbage plants under unusually wet conditions during the trial (2.87 inch rainfall), where during the second half of the test the soil remained saturated and humidity remained high.

Table 61. Efficacy on Green Peach Aphids (*Myzus persicae*) on Cabbage (*Brassica oleracea* var *capitata*), Palumbo, AZ, 2005.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]			
		1/24	2/4	2/17	3/5
Admire 2F (imidacloprid)	18 fl oz	29.4 bc (72)	179.4 bc (52)	75.2 c (95)	105.3 c (82)
Assail 30WG (acetamiprid)	4.0 oz	16.8 bc (84)	6.6 d (98)	65.5 c (96)	16.8 d (92)
Flonicamid 50WG (flonicamid)	2.3 oz	5.9 c (94)	4.7 d (99)	50.8 c (97)	16.8 d (97)
Untreated	-	106.6 a (0)	374.0 a (0)	1524.4 a (0)	592.9 a (0)

Data from AMT Vol 31: E7. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on LSD (P=0.05).
[z] Number of apterous aphids per plant.
[x] Percent control was calculated on the number of apterous aphids per plant.

In 2008, Kuhar conducted a field trial to determine efficacy of soil-applied insecticides for the control of foliar pests, including green peach aphids (*Myzus persicae*), on cabbage (*Brassica oleracea*). Insecticides were applied to transplants on Aug 19 with a one nozzle boom directed at the base of each plant. Both HGW86 and the standard Admire Pro provided excellent control of a heavy aphid infestation (Table 62).

Table 62. Efficacy on Green Peach Aphids (*Myzus persicae*), on Cabbage (*Brassica oleracea*), Kuhar, VA, 2008.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]			
		9/2	9/10	9/17	9/26
Admire Pro (imidacloprid)	3.6 fl oz	1.3 c (97)	0.3 c (99)	0.0 e (100)	2.3 de (100)
HGW86 20SC (cyantraniliprole)	5.1 fl oz	11.8 c (75)	0.5 c (98)	6.5 abc (91)	44.8 abc (94)
	10.3 fl oz	8.0 c (83)	0.0 c (100)	13.8 ab (81)	12.8 cde (98)
	13.5 fl oz	5.8 c (88)	0.0 c (100)	0.8 de (99)	6.0 cde (99)
Untreated	-	47.0 a (0)	23.5 a (0)	73.5 bcd (0)	737.5 a (0)

Data from AMT Vol 34: E7. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).
[z] Number of aphids per 5 plants.
[x] Percent control was calculated on the number of aphids per 5 plants.

In 2009, Kuhar conducted a field trial to determine efficacy of foliar insecticides applied on Sep 30 and Oct 22 for the control of green peach aphids (*Myzus persicae*), on cabbage (*Brassica oleracea*). Both Movento and the standard Provado provided good to excellent control of a moderate aphid infestation (Table 63).

Table 63. Efficacy on Green Peach Aphids (*Myzus persicae*), on Cabbage (*Brassica oleracea*), Kuhar, VA, 2009.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		10/6	10/16	10/26
Movento (spirotetramat)	4.0 fl oz	0.8 b (97)	4.0b c (88)	2.6 bc (84)
	5.0 fl oz	1.1 b (96)	3.8b c (89)	3.0 bc (82)
Provado 1.6F (imidacloprid)	3.8 fl oz	0.0 b (100)	2.5 c (93)	2.3 bc (86)
Untreated	-	25.9 ab (0)	34.0 a (0)	16.5 a (0)

Data from AMT Vol 35: E4. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).
[z] Number of aphids per 30 leaves.
[x] Percent control was calculated on the number of aphids per 30 leaves.

In 2010, Kuhar conducted a trial to determine efficacy of foliar insecticides applied on Oct 12 for the control of green peach aphids (*Myzus persicae*) on broccoli (*Brassica oleracea*). Each of the HGW86 treatments included methylated seed oil (MSO) surfactant at 0.25% v/v, and all other treatments included Penetrator Plus non-ionic surfactant at 0.25% v/v. All products provided good to excellent control of a moderate aphid infestation (Table 64).

Table 64. Efficacy on Green Peach Aphids (*Myzus persicae*), on Broccoli (*Brassica oleracea*), Kuhar, VA, 2010.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]			
		3 DAT	7 DAT	10 DAT	16 DAT
Assail 30SG (acetamiprid	4 oz	0.5 c (99)	2.0 b (97)	2.8 bc (94)	6.8 bc (93)
Beleaf (flonicamid)	2 oz	0.0 c (100)	0.0 b (100)	0.0 c (100)	1.3 bc (99)
Fulfill (pymetrozine)	2.8 oz	1.0b c (98)	2.0 b (97)	0.5 c (99)	13.5 bc (87)
HGW86 20SC (cyantraniliprole)	13.5 fl oz	11.3 bc (75)	19.5 b (71)	13.0 b (73)	12.0 bc (88)
	16.9 fl oz	14.5 b (68)	13.8 b (80)	4.3 bc (91)	35.0 b (66)
	20.5 fl oz	12.0 bc (74)	11.0 b (84)	6.0 bc (88)	23.8 bc (77)
Movento 2SC (spirotetramat)	5 fl oz	9.5 bc (79)	3.0 b (96)	0.3 c (99)	7.0 bc (93)
NAI-2302 (tolfenpyrad)	17 fl oz	0.0 c (100)	2.3 b (97)	1.3 c (97)	1.8 bc (98)
	21 fl oz	0.5 c (99)	0.3 b (100)	0.5 c (99)	0.0 c (100)
Tolfenpyrad 15EC (tolfenpyrad)	20 fl oz	4.8 bc (89)	2.3 b (97)	0.5 c (99)	6.0 bc (94)
Untreated	-	45.5 a (0)	67.5 a (0)	48.5 a (0)	102.8 a (0)

Data from AMT Vol 36: E4.

[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).

[z] Number of aphids per 10 leaves.

[x] Percent control was calculated on the number of aphids per 10 leaves.

In 2010, Palumbo conducted two trials to determine efficacy of several insecticides applied as foliar or soil treatments for control of green peach aphids (*Myzus persicae*) on cabbage (*Brassica oleracea* var *capitata).* Admire and Cyazypyr soil treatments were applied as sub-surface, soil injection by placing the insecticide 2 inches directly below each seed line with a fertilizer shank just prior to planting on Feb 9. Foliar treatments Assail and Movento were applied on Mar 20 and Apr 2 in the first trial, and Cyazypyr applied on Mar 21 and Apr 6 in the second trial. The adjuvant DyneAmic at 0.25% v/v. was mixed with all foliar treatments. In the first trial, all treatments provided good to excellent aphid control; however, because of a very high infestation, only Movento provided commercially acceptable control at the end of trial (Table 65). In the second trial, Admire soil treatment provided very good control of a very high infestation, while Cyazypyr soil and foliar treatments were less effective (Table 66). Cyazypyr applied foliar was more effective than the soil treatment.

Table 65. Efficacy on Green Peach Aphids (*Myzus persicae*) on Cabbage (*Brassica oleracea* var *capitata*), Trial 1, Palumbo, AZ, 2010.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]					
		3/23	3/27	4/2	4/9	4/16	4/23
Admire Pro (imidacloprid)	7 fl oz	13.5 b (94)	27.8 b (91)	58.7 c (93)	128.0 b (93)	273.5 b (88)	450.4 b (88)
Assail 30SG (acetamiprid)	5.0 oz	8.4 b (96)	44.8 b (86)	230.6 b (73)	76.6 b (96)	146.1 b (94)	241.2 b (94)
Movento 2SC (spirotetramat)	5 fl oz	16.5 b (93)	25.5 b (92)	114.0 bc (86)	38.0 b (98)	16.7 c (99)	20.1 c (99)
Untreated	-	227.0 a (0)	322.4 a (0)	839.1 a (0)	1714.0 a (0)	2265.0 a (0)	3716.7 a (0)

Data from AMT Vol 36: E17. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

[z] Number of apterous apterous aphids per plant.

[x] Percent control was calculated on the number of apterous aphids per plant.

Table 66. Efficacy on Green Peach Aphids (*Myzus persicae*) on Cabbage (*Brassica oleracea* var *capitata*), Trial 2, Palumbo, AZ, 2010.

Treatment (Active Ingredient)	Rate Per Acre	Application	Population Counts [z], Means Separations [y], and Percent Control [x]				
			3/24	3/27	4/5	4/13	4/21
Admire Pro (imidacloprid)	7 fl oz	Soil	25.1 c (91)	30.7 e (94)	57.1 e (95)	195.0 d (94)	315.4 d (91)
Cyazypyr 20SC (cyantraniliprole)	10.4 fl oz	Soil	80.8 bc (72)	278.1 bc (42)	455.7 cd (60)	1522.1 bc (51)	1391.2 bc (59)
Cyazypyr 10SC (cyantraniliprole)	14 fl oz	Foliar	44.1 bc (85)	220.3 cd (54)	349.8 d (69)	756.2 cd (76)	957.2 bcd (72)
Untreated	-	-	287.3 a (0)	481.9 a (0)	1131.3 a (0)	3101.3 a (0)	3370.8 a (0)

Data from AMT Vol 36: E18. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

[z] Number of apterous apterous aphids per plant.

[x] Percent control was calculated on the number of apterous aphids per plant.

In 2010, Bethke conducted a greenhouse trial to determine efficacy of foliar insecticides applied on Jan 21 for the control of green peach aphids (*Myzus persicae*) on verbena (*V. peruvinna*). Talstar Pro provided the best overall control throughout the duration of experiment, followed by Tristar and Avid (Table 67). Ecotrol looked ineffective.

Table 67. Efficacy on Green Peach Aphids (*Myzus persicae*), on Verbena (*V. peruvinna*), Bethke, CA, 2010.

Treatment (Active Ingredient)	Rate Per 100 Gal	Population Counts [z], Means Separations [y], and Percent Control [x]			
		1/20 (Pre)	4 DAT	15 DAT	26 DAT
Avid 0.15 EC (abamectin)	15.5 fl oz	35.2 a	3.2 bc (81)	1.0 b (88)	1.4 bc (61)
Ecotrol EC (rosemary & peppermint oils)	40.0 fl oz	16.8 a	8.6 ab (0)	8.0 a (0)	2.0 bc (0)
Talstar Pro (bifenthrin)	23.9 fl oz	40.2 a	1.4 c (93)	0.2 b (98)	0 c (100)
Tristar 30 SG (acetamiprid)	1.3 oz	25.6 a	3.4 bc (72)	0.4 b (93)	0 c (100)
Untreated	-	36.8 a	17.6 a (0)	8.6 a (0)	3.8 a (0)

Data from AMT Vol 36: G21.
[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).
[z] Number of aphids per 8 leaves.
[x] Henderson's percent control was calculated on the number of aphids per 8 leaves.

In 2011, Palumbo conducted a trial to determine efficacy of several conventional and experimental insecticides applied foliar on Mar 6 and 23 for control of green peach aphids (*Myzus persicae*) on cabbage (*Brassica oleracea* var *capitata).* All treatments significantly reduced a very high infestation for 14 days, with the exception of the Exirel which did not differ from the untreated check at 14 DAT (Table 68). Following the 2nd application a similar trend was observed, and all treatments, except Exirel, significantly reduced infestation for 28 DAT. Overall, Movento and Closer provided the most consistent control of green peach aphids, but only Movento provided commercially acceptable control of GPA on cabbage plants at the end of trial.

In 2012, Palumbo conducted a trial to determine efficacy of several conventional and experimental insecticides applied foliar on Mar 5 and 20 for control of green peach aphids (*Myzus persicae*) on cabbage (*Brassica oleracea* var *capitata).* All products significantly reduced a very high infestation at each sampling interval for 14 days, with the exception of the Aza-Direct and M-Pede (Table 69). Following the 2nd application all products significantly reduced infestation for 14 days. Overall, Movento, Closer and NNI-0101 provided the most consistent control of green peach aphids, but only Movento provided commercially acceptable control at the end of trial.

Table 68. Efficacy on Green Peach Aphids (*Myzus persicae*) on Cabbage (*Brassica oleracea* var *capitata*), Palumbo, AZ, 2011.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]							
		3/9	3/12	3/16	3/21	3/29	4/6	4/12	4/20
Assail 30SG (acetamiprid)	5.0 oz	18.4 d (94)	29.5 cde (90)	18.4 b (93)	18.5 c (70)	19.0 bc (90)	76.8 bc (75)	151.1 bcd (69)	599.0 bcd (54)
Beleaf 50WG (flonicamid)	2.8 fl oz	10.7 d (97)	27.1 cde (91)	23.8 b (91)	24.7 c (59)	10.3 c (95)	54.8 bc (82)	173.9 bc (64)	361.6 de (72)
Closer 2SC (sulfoxaflor)	2.9 fl oz	6.6 d (98)	6.2 e (98)	10.3 b (96)	19.0 c (69)	5.3 c (97)	11.9 c (96)	40.3 cd (92)	188.7 e (86)
Exirel 10SE (cyantraniliprole)	17 fl oz	79.8 bc (75)	41.4 cd (86)	76.3 b (71)	52.3 ab (14)	29.8 bc (84)	245.2 a (21)	226.0 b (53)	1359.9 a (0)
Movento 2F (spirotetramat)	5 fl oz	55.7 bcd (82)	9.3 de (97)	10.2 b (96)	15.2 c (75)	5.6 c (97)	9.4 c (97)	9.3 d (98)	34.9 e (97)
NNI-0101 20SC (pyrifluquinazon)	3.2 fl oz	15.3 d (95)	17.5 cde (94)	18.0 b (93)	23.7 c (61)	13.2 bc (93)	79.5 bc (75)	119.4 bcd (75)	533.1 cd (59)
Scorpion 35SL (dinetofuran)	7.5 fl oz	105.2 b (66)	98.3 b (66)	70.4 b (74)	33.0 bc (46)	45.3 b (76)	132.5 b (58)	204.8 b (58)	878.7 b (33)
Untreated	-	314.0 a (0)	292.3 a (0)	267.5 a (0)	60.8 a (0)	190.9 a (0)	312.2 a (0)	485.2 a (0)	1309.3 a (0)

Data from AMT Vol 37: E14. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

[z] Number of apterous aphids per plant.

[x] Percent control was calculated on the number of apterous aphids per plant.

Table 69. Efficacy on Green Peach Aphids (*Myzus persicae*) on Cabbage (*Brassica oleracea* var *capitata*), Palumbo, AZ, 2012.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]							
		3/8	3/12	3/19	3/23	3/27	4/3	4/10	4/17
Aza-Direct (azadirachtin) + M-Pede	16 fl oz + 2 % v/v	72.7 ab (36)	103.3 bc (49)	184.1 a (0)	119.8 bc (65)	257.3 ab (43)	272.7 b (61)	616.8 a (0)	606.5 cde (61)
Closer 2SC (sulfoxaflor)	2.0 fl oz	1.4 e (99)	5.5 ef (97)	16.1 de (90)	3.1 e (99)	4.3 e (99)	30.4 e (96)	96.0 d (79)	354.3 e (77)
M-Pede (potassium salts of fatty acids)	2 % v/v	47.6 abc (58)	116.3 ab (44)	95.3 ab (42)	184.5 b (46)	189.2 bc (58)	335.0 b (53)	971.2 a (0)	1098.3 ab (29)
Movento 2F (spirotetramat)	5 fl oz	11.5 d (90)	3.2 f (98)	10.0 e (94)	6.6 e (98)	4.9 e (99)	22.3 e (97)	12.7 e (97)	44.1 f (97)
NNI-0101 20SC (pyrifluquinazon)	3.2 fl oz	5.2 d (95)	7.9 e (96)	36.1 cd (78)	10.1 e (97)	21.6 d (95)	37.3 de (95)	102.9 d (78)	315.3 de (80)
Torac 15EC (tolfenpyrad)	21 fl oz	26.6 c (76)	80.1 bc (62)	29.6 cd (82)	40.9 cd (88)	64.5 c (86)	94.8 cd (87)	363.0 abc (21)	396.8 cde (74)
Untreated	-	112.8 a (0)	209.1 ab (0)	165.1 a (0)	344.1 a (0)	451.3 a (0)	707.6 a (0)	459.9 ab (0)	1552.3 a (0)

Data from AMT Vol 38: E13. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

[z] Number of aphids per plant.

[x] Percent control was calculated on the number of aphids per plant.

In 2012, Palumbo conducted a trial to determine efficacy of the new active ingredients sulfoxaflor, tolfenpyrad, and pyrifluquinazon applied with DyneAmic adjuvant on Feb 15 and Mar 5 as foliar alternatives for control of green peach aphids (*Myzus persicae*) on head lettuce (*Lactuca sativa* var *capitata).* All treatments provided significant reductions in the numbers of GPA, except for the Assail treatment which did not differ from the untreated check on three evaluation dates (Table 70). Numbers of GPA in the Torac plots were significantly lower than the untreated check on each evaluation. Torac did not however provide a consistently higher level of control compared to the higher rates of Closer and Pyrifluquinazon. Both of these treatments provided control levels equivalent to the industry standard Movento.

Table 70. Efficacy on Green Peach Aphids (*Myzus persicae*) on Head Lettuce (*Lactuca sativa* var. *capitata*), Palumbo, AZ, 2012.

Treatment (Active Ingredient)	Rate Per 100 Gal	Population Counts [z], Means Separations [y], and Percent Control [x]			
		2/21 (7 DAT)	2/29 (15 DAT)	3/12 (7 DAT2)	3/20 (15 DAT2)
Assail 30SG (acetamiprid)	4 oz	1.8 b (79)	5.7 ab (48)	6.8 ab (41)	4.4 a (31)
Closer 2SC (sulfoxaflor)	1.4 fl oz	1.4 b (84)	2.0 bc (82)	1.8 c (84)	1.3 b (80)
	2.1 fl oz	2.1 b (76)	1.1 cd (90)	1.1 c (90)	0.1 c (98)
	2.8 fl oz	1.0 b (88)	0.9 cd (92)	0.8 c (93)	0.4 c (94)
Movento 2F (spirotetramat)	5 fl oz	1.3 b (85)	0.9 cd (92)	1.1 c (90)	0.4 c (94)
Pyrifluquinazon 20SC (pyrifluquinazon)	3.2 fl oz	1.1 b (87)	0.7 d (94)	2.1 bc (82)	0.9 bc (86)
Torac 15EC (tolfenpyrad)	21 fl oz	2.2 b (90)	1.3 cd (88)	1.6 c (86)	1.6 b (75)
Untreated		8.6 a (0)	10.9 a (0)	11.5 a (0)	6.4 a (0)

Data from AMT Vol 39: E48.

[y] Means followed by same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

[z] Number of apterous aphids per plant.

[x] Percent control was calculated on the number of apterous aphids per plant.

In 2012, Kuhar conducted a trial to determine efficacy of foliar insecticides applied on Sep 17 for the control of green peach aphids (*Myzus persicae*), on bell pepper (*Capsicum annuum*). There was no significant treatment effect for the first two sample dates, but all treatments had noticeably fewer green peach aphids than the check (Table 71). Overall, Closer and Movento provided excellent control of a moderate infestation despite a rain event shortly after application, while NNI-0101 was slightly less effective. The percentage of pepper fruit with honey dew and/or sooty mold reflected the aphid count data, although it was not statistically significant.

In 2013, Palumbo conducted a trial to determine efficacy of several conventional and experimental insecticide compounds applied Mar 5 and 20 the for the control of green peach aphids (*Myzus persicae*) on cabbage (*Brassica oleracea* var *capitata).* All products provided good to excellent control of a very high GPA infestation (Table 72). In terms of knockdown efficacy, Closer provided the most significant reduction in GPA numbers at 3 days following each application. Closer also provided the best residual control (21 DAT) after the first application, but Movento clearly delivered the most significant residual control following the second application. Overall, GPA control was most consistent in the Closer and Movento treatments and these were the only products that provided commercially acceptable control of GPA on cabbage plants at the end of the trial.

Table 71. Efficacy on Green Peach Aphids (*Myzus persicae*), on Bell Pepper (*Capsicum annuum*), Kuhar, VA, 2012.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]			Percent Sooty Mold/StickyFruit from Honeydew
		3 DAT	7 DAT	16 DAT	
Aza-Direct (azadirachtin) + M-Pede (potassium salts of fatty acids)	12 fl oz + 1% v/v	285.8 a (0)	304.0 a (0)	104.0a (56)	16.3 a (23)
	20 fl oz + 2% v/v	29.5 a (87)	44.8 a (79)	38.3ab (84)	0.0 a (100)
Closer 2SC (sulfoxaflor) + NIS	1.5 fl oz + 0.25% v/v	7.3 a (97)	4.3 a (98)	0.8c (100)	1.3 a (94)
	2 fl oz + 0.25% v/v	3.8 a (98)	3.8 a (98)	2.5bc (99)	0.0 a (100)
Movento (spirotetramat) + MSO	4 fl oz + 0.25% v/v	39.5 a (83)	6.0 a (97)	5.3abc (98)	0.0 a (100)
NNI-0101 20SC (pyrifluquinazon)	3.2 fl oz	21.5 a (91)	12.5 a (94)	34.0ab (86)	1.3 a (94)
Untreated	-	233.8 a (0)	216.3 a (0)	236.5a (0)	21.3 a (0)

Data from AMT Vol 38: E38. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).

[z] Number of aphids per 20 leaves.

[x] Percent control was calculated on the number of aphids per 20 leaves and % sooty mold.

Table 72. Efficacy on Green Peach Aphids (*Myzus persicae*) on Cabbage (*Brassica oleracea* var *capitata*), Palumbo, AZ, 2013.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]							
		3/5	3/9	3/13	3/16	3/21	3/25	4/1	4/8
Closer 2SC (sulfoxaflor)	1.5 fl oz	2.4 e (98)	2.5 e (98)	11.2 cde (93)	13.4 bc (95)	2.3 c (99)	9.4 c (97)	28.8 d (96)	98.1 e (78)
	2.0 fl oz	3.3 e (97)	3.3 de (98)	6.5 de (96)	8.7 c (96)	3.6 c (98)	7.9 c (98)	45.4 d (94)	87.0 e (80)
Exirel 10SE (cyantraniliprole)	20 fl oz	7.2 d (93)	9.1 cd (93)	23.5 bc (86)	25.4 bc (90)	9.4 b (96)	46.7 b (87)	87.7 c (88)	189.4 bc (57)
Movento 2SC (spirotetramat)	5 fl oz	9.5 cd (91)	2.7 e (98)	4.6 e (97)	3.4 d (99)	15.8 b (93)	11.3 c (97)	18.7e (97)	16.6 f (96)
Pyrifluquinazon 20SC (pyrifluquinazon)	2.4 fl oz	13.9 bcd (87)	5.0 cde (96)	15.0 cd (91)	23.6 bc (91)	16.6 b (93)	30.7 b (91)	132.9 bc (81)	152.3 cd (65)
	3.2 fl oz	7.2 d (93)	5.8 cde (96)	11.3 cde (93)	22.2 bc (91)	20.7 b (91)	26.4 b (93)	114.7 bc (84)	134.1 cde (69)
Sivanto 200SL (flupyradiflurone)	7 fl oz	6.1 d (94)	7.8 b-e (94)	34.8 bc (80)	26.3 b (89)	14.6 b (94)	42.5 b (88)	168.6 b (76)	267.5 ab (39)
Torac 15EC (tolfenpyrad)	21 fl oz	37.2 b (64)	14.6 bc (89)	41.0 b (75)	27.8 b (89)	20.5 b (91)	39.7 b (89	184.2 b (74)	172.2 bc (61)
Untreated	-	104.2 a (0)	133.2 a (0)	164.9 a (0)	248.8 a (0)	239.9 a (0)	360.0 a (0)	710.3 a (0)	436.3 a (0)

Data from AMT Vol 39: E44.

[y] Means followed by same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

[z] Number of aphids per plant.

[x] Percent control was calculated on the number of aphids per plant.

In 2013, Whalen conducted a trial to determine efficacy of foliar insecticides applied on Aug 14 for the control of green peach aphids (*Myzus persicae*) on bell pepper (*Capsicum anuum)*. All products provided significant reductions in the numbers of GPA at 5 DAT (Table 73). Only, Acephate, Beleaf and Sivanto at 7.5 oz had significantly fewer GPA at 14 DAT. There were no significant differences among treatments at 21 DAT.

Table 73. Efficacy on Green Peach Aphids (*Myzus persicae*) on Bell Pepper(*Capsicum anuum*), Whalen, DE, 2013.

Treatment (Active Ingredient)	Rate Per 100 Gal	Population Counts [z], Means Separations [y], and Percent Control [x]			
		8/12 (Pre)	8/19 (5 DAT)	8/28 (14 DAT)	9/4 (21 DAT)
Acephate 97UP (acephate)	1 lb	6.3 a	2.5 b (94)	5.0 b (80)	6.3 a (0)
Beleaf 50SG (flonicamid)	2.8 oz	10.8 a	2.0 b (97)	1.8 b (96)	2.0 a (79)
Fulfill 50 WDG (pymetrozine)	2.8 oz	5.3 a	3.0 b (91)	10.0 ab (52)	2.0 a (79)
Movento 2SC (spirotetramat)	5 fl oz	2.8 a	4.3 b (76)	11.3 ab (0)	5.5 a (0)
Sivanto 200SL (flupyradiflurone)	7.5 fl oz	6.3 a	3.8 b (90)	1.3 b (95)	1.8 a (84)
	10.0 fl oz	6.5 a	1.0 b (98)	5.8 ab (77)	1.3 a (78)
Untreated	-	4.8 a	30.3 a (0)	18.8 a (0)	4.3 a (0)

Data from AMT Vol 39: E81. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Tukey's mean separation test (P=0.05).

[z] Number of aphids per 20 leaves.

[x] Percent control was calculated on the number of aphids per 20 leaves.

In 2013, Grasswitz conducted a trial to determine efficacy of organically acceptable foliar insecticides applied on Apr 26 for the control of green peach aphids (*Myzus persicae*) on peach (*Prunus persica)*. Pyganic and Azera provided comparable control 1 DAT, but at 3 and 7 DAT, the level of control provided by the former was significantly higher than all other products (Table 74). The petroleum-based insecticide, Suffoil-X, was slow to take effect but gave control comparable to Azera by 7 days after application. Neither Neem Oil nor the insecticidal soap M-Pede provided an acceptable level of control.

Table 74. Efficacy on Green Peach Aphids (*Myzus persicae*) on Peach (*Prunus persica*), Grasswitz, NM, 2013.

Treatment (Active Ingredient)	Rate Per 100 Gal	Population Counts [z], Means Separations [y], and Percent Control [x]			
		Pre	1 DAT	3 DAT	7 DAT
Azera (azadirachtin+pyrethrins)	1.2 gal	30.6 a	14.0 a (69)	18.4 b (62)	15.1 b (57)
M-Pede (potassium salts of fatty acids)	2 % v/v	32.2 a	39.0 bc (18)	34.8 c (31)	38.7 cd (0)
Neem oil 70%	3 qt	34.3 a	37.0 bc (27)	40.5 cd (25)	37.6 cd (5)
Pyganic 1.4 EC (pyrethrins)	1.2 gal	33.4 a	14.2 a (71)	10.2 a (81)	10.8 a (72)
Suffoil-X (paraffinic oil)	1.5 gal	34.7 a	32.1 b (37)	34.2 c (37)	21.4 b (47)
Untreated	-	31.4 a	46.2 c (0)	49.5 d (0)	36.4 d (0)

Data from AMT Vol 39: B7.

[y] Means followed by same letter do not differ significantly based on Mann-Whitney test (P=0.05).

[z] Number of aphids per leaf.

[x] Percent control was calculated on the number of aphids per per leaf.

In 2013, Alyokhin conducted a trial to determine efficacy of several insecticides applied foliar on Aug 4 and 12 for the control of green peach aphids (*Myzus persicae*), on potatoes (*Solanum tuberosum*). MBI-203 at 1 and 2 lb per acre, and MBI-206 at 1 gal/acre provided comparable efficacy as the standard Transform (Table 75).

Table 75. Efficacy on Green Peach Aphids (*Myzus persicae*) on Potatoes (*Solanum tuberosum*), Alyokhin, ME, 2013.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		7/31 (Pre)	8/12	8/20
MBI-203 DF (*Chromobacterium subtsugae* strain PRAA4-1^T)	1 lb	6.8 ab	0.0 a (100)	0.0 b (100)
	2 lb	7.0 ab	0.2 a (83)	1.1 b (94)
	3 lb	4.2 b	0.6 a (14)	5.0 ab (58)
MBI-206 (*Burkholderia* sp. strain A396)	1 gal	10.9 a	0.6 a (67)	2.4 ab (92)
	2 gal	7.3 ab	1.1 a (9)	27.2 a (0)
Transform 50WG (sulfoxaflor)	1.5 oz	12.1 a	1.7 a (15)	5.3 ab (85)
Untreated	-	14.5 a	2.4 a (0)	41.0 a (0)

Data from AMT Vol 39: E2.

[y] Means followed by same letter do not differ significantly based on Fisher's LSD (P=0.05).

[z] Number of apterous aphids per 20 plants.

[x] Henderson's percent control was calculated on the number of apterous aphids per 20 plants.

Comparative Efficacy on Nasanovia ribisnigri

In 2003, Palumbo conducted a trial to determine efficacy of several insecticides applied as foliar or soil treatments for control of various aphids, including lettuce aphids (*Nasanovia ribisnigri),* on lettuce (*Lactuca sativa)*. The at-planting soil applications of Admire and Platinum were applied as a pre-plant injection at a depth of 1.5 inches below the seed line at bed shaping in 15 gpa final dilution. The side-dress treatments were applied at second side dress (Jan 15) similar to fertilizer side-dress. A total of three spray applications were applied on Jan 21, Feb 4 and Feb 16. An adjuvant was applied to all foliar treatments: DyneAmic on the first application and Exit on the second and third applications at 0.125% v/v. All treatments provided excellent control of lettuce aphids (Table 76).

In 2005, Palumbo conducted a trial to compare the efficacy of several new insecticides with industry standards for control of various insects, including lettuce aphids (*Nasanovia ribisnigri),* on romaine lettuce (*Lactuca* sativa var *longifloria).* A total of three spray applications were applied on Feb 25, Mar 7 and 17 with DyneAmic at 0.06 - 0.125% v/v. Movento provided the most significant reduction in aphid numbers considering that it was only applied twice (Table 77). Provado applied at an almost 2X rate provided inconsistent aphid control.

In 2007, Palumbo conducted a trial to evaluate the efficacy of Movento (spirotetramat), when applied as a pre-harvest spray to romaine lettuce hearts heavily infested with several aphids, including lettuce aphids (*Nasanovia ribisnigri),* on romaine lettuce (*Lactuca* sativavar *longifloria)*. Treatments consisted of foliar sprays of Movento applied alone, and sprays of Movento, Beleaf and Assail applied in combination with Thionex on the first application and Capture on the second application. Aphid pressure was very heavy when the spray was applied, well above the recommended action threshold for aphids.All treatments significantly reduced aphid numbers, but only the Movento treatments provided control sufficient enough to be acceptable for the fresh romaine market at harvest (Table 78). Addition of Thionex or Capture to Movento did not significantly improve performance.

Table 76. Efficacy on Lettuce Aphids (*Nasanovia ribisnigri)* on Lettuce (*Lactuca sativa*), Palumbo, AZ, 2003.

Treatment (Active Ingredient)	Rate Per Acre	Timing	Population Counts [z], Means Separations [y], and Percent Control [x]	
			Frame Leaves	Heads
Actara 25W (thiamethoxam)	3.0 oz	Foliar	0.0 b (100)	0.0 b (100)
Assail 70WP (acetamiprid)	1.7 oz	Foliar	0.0 b (100)	0.0 b (100)
Dinotefuran 20SG (dinotefuran)	4.0 oz	Foliar	0.0 b (100)	0.4 b (98)
Flonicamid 50DF (flonicamid)	8.0 oz	Foliar	0.0 b (100)	0.0 b (100)
Fulfill 50WG (pymetrozine)	2.7 oz	Foliar	0.0 b (100)	1.7 b (92)
Admire 2F (imidacloprid)	16 fl oz	Soil - at planting	0.0 b (100)	0.9 b (96)
Dinotefuran 20SG (dinotefuran)	1.1 lb	Soil - sidedress	0.0 b (100)	1.6 b (92)
Platinum 2SC (thiamethoxam)	8.0 fl oz	Soil - at planting	0.0 b (100)	0.0 b (100)
Platinum 2SC (thiamethoxam)	8.0 fl oz	Soil - sidedress	0.0 b (100)	0.8 b (96)
Untreated	-	-	1.3 a (0)	21.3 a (0)

Data from AMT Vol 29: E46.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of apterous aphids per plant at harvest.

[x] Percent control was calculated on the number of apterous aphids per plant at harvest.

Table 77. Efficacy on Lettuce Aphids (*Nasanovia ribisnigri)* on Romaine Lettuce (*Lactuca sativa* var *longifloria*), Palumbo, AZ, 2005.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]		
		3/7	3/17	3/28
Movento 150OD (spirotetramat)*	8.0 fl oz	12.9 c (91)	62.1 bc (53)	13.6 d (94)
Provado 1.6F (imidacloprid)	6.5 fl oz	49.7 bc (65)	12.6 c (90)	52.7 cd (76)
Untreated	-	140.3 a (0)	131.1 ab (0)c	215.7 ab (0)

Data from AMT Vol 32: E24. Not all products tested included in table.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of apterous aphids per plant.

[x] Percent control was calculated on the number of apterous aphids per plant.

* Movento received sprays on Feb 25 and Mar 17 only, Provado sprayed 3 times (Feb 25, Mar 7 and 17).

Table 78. Efficacy on Lettuce Aphids (*Nasanovia ribisnigri)* on Romaine Lettuce (*Lactuca sativa* var *longifloria*), Palumbo, AZ, 2007.

Date	Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]
Mar 4 (Pre)	Assail 30SG (acetamiprid) + Thionex 3EC	4 oz + 32 fl oz	156.3 a
	Beleaf 50SG (flonicamid) + Thionex 3EC	2.8 oz + 32 fl oz	155.3 a
	Movento 2SC + Thionex 3EC	8 fl oz + 32 fl oz	199.5 a
	Movento 2SC (spirotetramat)	8.0 fl oz	179.0 a
	Untreated	-	178.5 a
Mar 14 (7 days preharvest)	Assail 30SG + Thionex 3EC	4 oz + 32 fl oz	333.2 b (55)
	Beleaf 50SG + Thionex 3EC	2.8 oz + 32 fl oz	511.71 b (31)
	Movento 2SC + Thionex 3EC	8 fl oz + 32 fl oz	9.8 c (99)
	Movento 2SC	8.0 fl oz	12.4 c (99)
	Untreated	-	850.8 a (0)
Mar 21 (Harvest)	Assail 30SG + Capture 2SC	4 oz + 5 fl oz	293.7 b (64)
	Beleaf 50SG + Capture 2SC	2.8 oz + 5 fl oz	224.7 b (73)
	Movento 2SC + Capture 2EC	8 fl oz + 5 fl oz	2.1 c (100)
	Movento 2SC	8 fl oz	2.2 c (100)
	Untreated	-	942.7 a (0)

Data from AMT Vol 33: E32.

[y] Means followed by same letter do not differ significantly based on Fisher's Protected LSD (P=0.05).

[z] Number of apterous aphids per plant.

[x] Henderson's percent control was calculated on the number of apterous aphids per plant.

In 2009, Palumbo conducted a trial to evaluate the efficacy of three newer products applied foliar with DyneAmic at 0.5% v/v on Mar 1 and 17 for the control of lettuce aphids (*Nasanovia ribisnigri*) on head lettuce (*Lactuca sativa* var *capitata*). Infestation was light when the first spray was applied, but had exceeded the action threshold of 10% infested plants. All products significantly reduced infestation, with Movento providing the best control (Table 79). Overall, results from this study suggested that Movento had a more significant influence on lettuce aphid control in head lettuce than the other standard insecticides used in desert lettuce production.

In 2013, Sances conducted a trial to evaluate the efficacy insecticides applied foliar for the control of lettuce aphids (*Nasanovia ribisnigri*) on head lettuce (*Lactuca sativa* var *capitata*). Treatments were applied when the crop was at the rosette stage (Jul 17), pre-heading (Jul 25) and post-heading (Aug 8). All products provided good to excellent control of a moderate lettuce aphid infestation (Table 80).

Table 79. Efficacy on Lettuce Aphids (*Nasanovia ribisnigri)* on Lettuce (*Lactuca* sativa var *capitata*), Palumbo, AZ, 2009.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]					
		3/27 (Pre)	3/9	3/16	3/24	4/1	4/8
Assail 30SG (acetamiprid)	4 oz	3.1 a	1.0 b (83)	0.4 a (84)	0.5 b (81)	1.3 c (96)	25.2 b (81)
Beleaf 50SG (flonicamid)	2.8 oz	3.1 a	2.5 b (57)	0.5 a (79)	0.1 b (96)	14.8 b (58)	28.8 b (78)
Movento 2SC (spirotetremat)	5 fl oz	3.0 a	2.1 b (62)	0.3 a (87)	0.1 b (96)	0.5 c (99)	1.5 b (99)
Untreated	-	2.8 a	5.2 a (0)	2.2 a (0)	2.4 a (0)	31.5 a (0)	118.4 a (0)

Data from AMT Vol 35: E10.

[y] Means followed by same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

[z] Number of apterous aphids per plant.

[x] Percent control was calculated on the number of apterous aphids per plant.

Table 80. Efficacy on Lettuce Aphids (*Nasanovia ribisnigri)* on Lettuce (*Lactuca* sativa var *capitata*), Sances, CA, 2013.

Treatment (Active Ingredient)	Rate Per Acre	Population Counts [z], Means Separations [y], and Percent Control [x]					
		7/23	8/1	8/3	8/7	8/19	Ave
Assail 70WP (acetamiprid)	1.7 oz	0.08 b (100)	1.20 c (98)	2.81 c (96)	0.47 e (99)	0.47 c (97)	0.88 de (98)
Beleaf 50SG (flonicamid)	2.8 oz	0.20 b (99)	0.88 c (98)	2.08 cd (97)	0.82 e (98)	0.31 c (98)	0.81 de (98)
Closer SC (sulfoxaflor)	2 fl oz	0.03 b (100)	1.01 c (98)	1.86 cd (98)	0.90 de (98)	0.65 bc (96)	0.91 de (98)
Fulfill (pymetrozine)	2.8 oz	2.65 b (92)	5.03 b (90)	7.91 b (90)	3.21 b (93)	1.64 b (90)	4.30 b (90)
Movento 2SC (spirotetremat)	4 fl oz	0.58 b (98)	0.83 c (98)	1.74 cd (98)	2.15 bcd (96)	0.55 bc (97)	1.30 d (97)
	5 fl oz	0.63 b (98)	0.93 c (98)	0.75 d (99)	0.51 e (99)	0.10 c (99)	0.57 e (99)
Nuprid 2F (imidacloprid)	1.3 fl oz	1.65 b (95)	1.87 c (96)	8.79 b (89)	2.33 bc (95)	0.84 bc (95)	2.55 c (94)
Pasada 1.6 F (imidacloprid)	3.5 fl oz	0.30 b (99)	2.20 bc (96)	3.94 bc (95)	1.17 cde (98)	0.74 bc (96)	1.57 cd (97)
Warrior II (lambda-cyhalothrin)	1.9 fl oz	0.18 b (99)	1.62 c (97)	1.64 cd (98)	1.10 cde (98)	0.61 bc (96)	1.11 de (98)
Untreated	-	32.73 a (0)	52.54 a (0)	79.25 a (0)	48.63 a (0)	16.80 a (0)	44.89 a (0)

Data from AMT Vol 39: E57.

[y] Means followed by same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

[z] Number of apterous aphids per plot.

[x] Percent control was calculated on the number of apterous aphids per plot.

Comparative Efficacy on Tinocallis kahawaluokalani

In 2008, Gu conducted a greenhouse trial to determine efficacy of several insecticides applied foliar for control of crapemyrtle aphids (*Tinocallis kahawaluokalani)* on crapemyrtle (*Lagerstroemia indica*). Treatments were applied on Aug 29 (T1), and all treatments except the Volck oil were reapplied on Sept 4. All treatments, except Azatin, provided significant control by 5 DAT1, but all treatments, including Azatin, gave significant control by 10 DAT1 (Table 81). The two organophosphate treatments, Orthene and Malathion, gave best control overall, but by 20 DAT1, populations were resurging in all treated plots.

Table 81. Efficacy on Crapemyrtle Aphid (*Tinocallis kahawaluokalani)* on Crapemyrtle (*Lagerstroemia indica*), Gu, MS, 2008.

Treatment (Active Ingredient)	Rate Per Gal	Population Counts [z], Means Separations [y], and Percent Control [x]		
		5 DAT1	10 DAT1	20 DAT1
Azatin XL (azadirachtin)	4.72 ml	122.5 ab (52)	13.5 bc (90)	48.8 a (0)
Bonide Pyrethrins (pyretrhins) + Rotenone	1.0 tsp	14.5 cd (94)	6.5 bcd (95)	31.8 a (26)
Hi-Yield Malathion 55% (malathion)	1.5 tsp	2.5 de (99)	0.2 de (100)	20.3 a (53)
Orthene 97SP (acephate)	1.13 g	0.2 e (100)	0.0 e (100)	16.7 a (61)
Ortho Volck Oil 97% EC (petroleum oil)	2.5 fl oz	0.7 e (100)	12.5 bc (91)	25.2 a (41)
Safer Insect Killing Soap 50% LC (potassium salts of fatty acids)	2.5 fl oz	8.7 cd (97)	2.7 cde (98)	22.0 a (49)
Untreated	-	257.3 a (0)	133.7 a (0)	43.0 a (0)

Data from AMT Vol 34: G30. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on Tukey's test (P=0.10).
[z] Number of aphids per 3 leaves.
[x] Percent control was calculated on the number of aphids per 3 leaves.

In 2008, Layton conducted a greenhouse trial to determine efficacy of several systemic insecticides applied as drenches on Sep 8 to plants grown on 6-in pots for control of crapemyrtle aphids (*Tinocallis kahawaluokalani)* on crapemyrtle (*Lagerstroemia indica*). All products provided excellent control of aphids through 45 DAT, even though aphid populations increased sharply in the untreated check during this time (Table 82).

Table 82. Efficacy on Crapemyrtle Aphid (*Tinocallis kahawaluokalani)* on Crapemyrtle (*Lagerstroemia indica*), Layton, MS, 2008.

Treatment (Active Ingredient)	Rate	Population Counts [z], Means Separations [y], and Percent Control [x]			
		10 DAT	22 DAT	31 DAT	45 DAT
Merit 2F (imidacloprid)	24 fl oz/1000 pots	0.0 b (100)	0.5 b (100)	0.5 b (100)	0.0 b (100)
Safari 20SG (dinotefuran)	1.7 oz/1000 pots	0.3 b (98)	0.9 b (100)	1.4 b (100)	0.0 b (100)
Flagship 25WG (thiamethoxam)	4 oz/100 gal	0.0 b (100)	0.1 b (100)	0.5 b (100)	0.1 b (100)
Untreated	-	13.6 a (0)	181.3 a (0)	413.0 a (0)	173.1 a (0)

Data from AMT Vol 34: G31. Not all products tested included in table.
[y] Means followed by same letter do not differ significantly based on Tukey's test (P=0.10).
[z] Number of aphids per 3 leaves.
[x] Percent control was calculated on the number of aphids per 3 leaves.

Efficacy Summary by Active Ingredient

A brief efficacy summary for select products is given below, with a reminder that there are very limited published data available to draw definitive conclusions for each product/pest species. Products that were selected were currently registered and those that may be of interest for registration.

Abamectin. Avid provided good efficacy against melon aphids (*Aphis gossypii)* on zinnia, and against green peach aphids (*Myzus persicae*) on verbena in two greenhouse trials.
Acephate. Orthene provided excellent efficacy against foxglove aphids (*Aulacorthum solani)* on bugle, and against crapemyrtle aphid (*Tinocallis kahawaluokalani)* on crapemyrtle, and good efficacy against melon aphids (*Aphis gossypii)* on zinnia in three greenhouse trials. Acephate 97UP provided good efficacy against green peach aphids (*Myzus persicae*) in a bell pepper trial.
Acetamiprid. Tristar provided excellent efficacy against cotton aphids (*Aphis gossypii)* on gerbera daisy, and against green peach aphids (*Myzus persicae*) on verbena in two greenhouse trials. On food crops, Assail generally provided excellent efficacy against lettuce aphids (*Nasanovia ribisnigri)* in 4 lettuce trials, good to excellent efficacy against rosy apple aphids (*Dysaphis plantaginea)* in 3 apple trials, good and excellent efficacy against spirea aphids (*Aphis spiraecola)* in 2 apple trials, and against melon aphids (*Aphis gossypii)* in 2 trials on cantaloupe and strawberry. It provided good efficacy against pea aphids (*Acyrthosiphon pisum*) in a field pea trial, and against turnip aphids (*Lipaphis pseudobrassicae)* in a Chinese cabbage trial. Against green peach aphids (*Myzus persicae*), generally good to excellent efficacy was obtained in 11 trials on lettuce, potatoes, turnip, collard, broccoli, and cabbage. It provided poor to excellent efficacy against foxglove aphids (*Aulacorthum solani)* in 4 lettuce trials, and against *Acyrthosipon lactucae* in 2 lettuce trials. Poor efficacy was obtained against wooly apple aphids (*Eriosoma lanigerum)* in an apple trial, and against potato aphids (*Macrosiphum euphorbia*) in a tomato trial.
Azadirachtin. Azatin provided good efficacy against melon aphids (*Aphis gossypii)* on zinnia, and against crapemyrtle aphids (*Tinocallis kahawaluokalani)* on crapemyrtle in two greenhouse trials. On food crops, AzaDirect provided excellent efficacy against rosy apple aphids (*Dysaphis plantaginea)* in an apple trial, and poor to good efficacy against green peach aphids (*Myzus persicae*) in 3 trials on spinach, cabbage and bell pepper. Poor efficacy was obtained against wooly apple aphids (*Eriosoma lanigerum)* in 2 apple trials, and against potato aphids (*Macrosiphum euphorbia*) in a tomato trial. Similarly, Neemix provided poor efficacy against green peach aphids in a turnip trial.
Beauvaria bassiana. Botanigard 22WP provided good to excellent efficacy, but Botanigard ES provided fair efficacy, against melon aphids (*Aphis gossypii)* in a zinnia greenhouse trial.
Bifenthrin. Talstar Pro provided excellent efficacy against melon aphids (*Aphis gossypii)* on zinnia and of green peach aphids (*Myzus persicae*) on verbena in two greenhouse trials. Capture and Discipline provided excellent efficacy against pea aphids (*Acyrthosiphon pisum*) in a field pea trial, but poor efficacy against turnip aphids (*Lipaphis pseudobrassicae)* in a Chinese cabbage trial.
Burkholderia sp. strain A396. MBI-206 provided good efficacy against green peach aphids (*Myzus persicae*) in a potato trial.
Chlorpyrifos. Lorsban Advanced provided excellent efficacy against pea aphids (*Acyrthosiphon pisum*) and cowpea aphids (*Aphis craccivora*) in 2 alfalfa trials, and Lorsban 75WG provided excellent efficacy against rosy apple aphids (*Dysaphis plantaginea)* in an apple trial.
Chromobacterium subtsugae. MBI-203 provided excellent efficacy against green peach aphids (*Myzus persicae*) in a potato trial, and fair efficacy against rosy apple aphids (*Dysaphis plantaginea)* in an apple trial.
Cyantraniliprole. HGW86 and Exirel applied foliar provided excellent efficacy against melon aphids (*Aphis gossypii)* in a summer squash trial, against cotton aphids (*Aphis gossypii*) in a citrus trial, against rosy apple aphids (*Dysaphis plantaginea)* in 2 apple trials, and against potato aphids (*Macrosiphum euphorbia*) in a tomato trial. It provided good and excellent efficacy against green peach aphids (*Myzus persicae*) in 2 cabbage trials, and poor efficacy against wooly apple aphids (*Eriosoma lanigerum)* in an

apple trial. HGW86 applied as soil treatment provided excellent efficacy against potato aphids in a tomato trial, and good and excellent efficacy against green peach aphids in 2 trials on broccoli and cabbage. Cyazypyr applied as foliar or soil treatment provided fair efficacy against green peach aphids in 2 cabbage trials.

Dimethoate. Dimethoate provided excellent efficacy against pea aphids (*Acyrthosiphon pisum*) in 2 trials on field pea and alfalfa, and against foxglove aphids (*Aulacorthum solani)* in a lettuce trial. It provided fair and excellent efficacy against cowpea aphids (*Aphis craccivora*) in 2 alfalfa trials, good efficacy against wooly apple aphids (*Eriosoma lanigerum)* in an apple trial, and against green peach aphids (*Myzus persicae*) in a lettuce trial.

Dinotefuran. Safari 20 SG applied foliar or drench provided excellent efficacy against cotton aphids (*Aphis gossypii)* and crapemyrtle aphids (*Tinocallis kahawaluokalani)* in 2 greenhouse trials on gerbera daisy and crapemyrtle. V-10112 20SG provided excellent efficacy against melon aphids (*Aphis gossypii)* when applied as drench, but only fair efficacy when applied foliar in a chrysanthemum trial. In a bugle trial, poor efficacy against foxglove aphids (*Aulacorthum solani)* was obtained from foliar treatment. For food crops, Venom 20SG provided excellent efficacy against lettuce aphids (*Nasanovia ribisnigri)* applied foliar or to soil. Foliar application provided good efficacy against melon aphids in a pumpkin trial, and fair efficacy against *Acyrthosipon lactucae* in a lettuce trial. In another lettuce trial, fair efficacy was obtained against foxglove aphids when applied foliar, but poor efficacy when applied to soil. On potato aphids (*Macrosiphum euphorbia*), foliar application provided poor efficacy in a tomato trial and virtually no efficacy in a potato trial. Similarly, no efficacy on green peach aphids (*Myzus persicae*) was obtained with Dinotefuran 20SG in a potato trial and with Scorpion 35SL in a cabbage trial.

Flonicamid. F1785 and Flonicamid provided provided excellent efficacyagainst foxglove aphids (*Aulacorthum solani)* in a bugle trial, and good efficacy against melon aphids (*Aphis gossypii)* in a chrysanthemum trial. For food crops, Beleaf and V-10170 50WDG generally provided excellent efficacy against green peach aphids (*Myzus* persicae) in 7 trials on lettuce, cabbage, broccoli, bell pepper and collard, and good efficacy in 3 trials on broccoli and potato. Excellent efficacy was obtained for *Acyrthosipon lactucae,* lettuce aphids (*Nasanovia ribisnigri*) and foxglove aphids (*Aulacorthum solani)* in 9 lettuce trials, for potato aphids (*Macrosiphum euphorbia*) in a potato trial, and for spirea aphids (*Aphis spiraecola)* in an apple trial. Good efficacy was obtained for melon aphids (*Aphis gossypii)* in a pumpkin trial. It provided fair efficacy against pea aphids (*Acyrthosiphon pisum)* in an alfalfa trial, and against turnip aphids (*Lipaphis pseudobrassicae*) in a Chinese cabbage trial, while poor and fair efficacy was obtained against cowpea aphids (*Aphis craccivora)* in 2 alfalfa trials. Although Beleaf provided less than good to excellent efficacy in some trials, this product causes aphids to stop feeding shortly after exposure; thus, although the aphids remain alive on the plants after treatment, no further damage occurs.

Flupyradiflurone. Sivanto provided excellent efficacy against rosy apple aphids (*Dysaphis plantaginea)* and wooly apple aphids (*Eriosoma lanigerum)* in 2 apple trials, and good and excellent efficacy against green peach aphids (*Myzus persicae*) in 2 trials on cabbage and bell pepper.

Imidacloprid., Marathon II applied foliar provided excellent efficacy against foxglove aphids (*Aulacorthum solani*) in a bugle trial. Marathon II and Merit soil treatments provided excellent efficacy against crapemyrtle aphids (*Tinocallis kahawaluokalani)* and melon aphids (*Aphis gossypii)* in 2 greenhouse trials on crapemyrtle and chrysanthemum. On food crops, Provado 1.6 F, Nuprid 2F and Pasada 1.6F applied foliar generally provided excellent efficacy against *Acyrthosipon lactucae* in 1 lettuce trial, against foxglove aphids in 3 trials on bugle and lettuce, against rosy apple aphids (*Dysaphis plantaginea*) in 4 apple trials, against potato aphids (*Macrosiphum euphorbia*) in 5 trials on potato and tomato, against green peach aphids (*Myzus persicae*) in 9 trials on cabbage, lettuce, potato, spinach and turnip, against melon aphids (*Aphis gossypii)* in 1 cantaloupe trial but only fair efficacy in 1 pumpkin trial. Good to excellent efficacy was obtained against wooly apple aphids (*Eriosoma lanigerum),* in 2 apple trials, against turnip aphids (*Lipaphis* spp.) in 2 turnip trials, and against lettuce aphids (*Nasanovia ribisnigri*) in 2 lettuce trials. Good efficacy was obtained against pea aphid (*Acyrthosiphon pisum)* in a field pea trial. Admire soil treatments provided excellent efficacy against *Acyrthosipon lactucae* and

lettuce aphids in 2 lettuce trials, and against potato aphids in a potato trial, and good to excellent efficacy against green peach aphids in 3 trials on broccoli and cabbage.

Lambda-cyhalothrin. Warrior provided excellent efficacy against cowpea aphids (*Aphis craccivora)* in 2 alfalfa trials, good to excellent efficacy against pea aphids (*Acyrthosiphon pisum)* in 2 trials on field pea and alfalfa, and good efficacy against spirea aphids (*Aphis spiraecola),* in an apple trial.

Malathion. Malathion provided excellent efficacy against crapemyrtle aphids (*Tinocallis kahawaluokalani)* in a greenhouse crapemyrtle trial. In 3 alfalfa trials, it provided excellent efficacy against cowpea aphids (*Aphis craccivora)* and good efficacy against pea aphids (*Acyrthosiphon pisum)*.

Methiocarb. Mesurol provided poor efficacy against melon aphids (*Aphis gossypii)* in a greenhouse trial on zinnia.

Neem Oil. Trilogy and Neem Oil 70% provided poor efficacy against potato aphids (*Macrosiphum euphorbia*) in a tomato trial, and against green peach aphids (*Myzus persicae*) in a peach trial.

Potassium Salts of Fatty Acids. Safer Soap provided excellent efficacy against crapemyrtle aphids (*Tinocallis kahawaluokalani)* in a greenhouse crapemyrtle trial, while M-Pede provided poor efficacy against green peach aphids (*Myzus persicae*) in 2 trials on cabbage and peach.

Pymetrozine. Endeavor provided good efficacy against foxglove aphids (*Aulacorthum solani)* in a greenhouse bugle trial. On food crops, Fulfill provided excellent efficacy against foxglove aphids and *Acyrthosipon lactucae,* in 3 lettuce trials, and against turnip aphids (*Lipaphis pseudobrassicae)* in a Chinese cabbage trial. Good and excellent efficacy was obtained against lettuce aphids (*Nasanovia ribisnigri)* in 2 lettuce trials. Against green peach aphids (*Myzus persicae*), it provided fair to excellent efficacy in 3 potato trials, fair to good efficacy in 4 trials on lettuce, bell pepper and turnip, and poor to excellent efficacy in 3 trials on broccoli and spinach. It provided poor and good efficacy against potato aphids in 2 potato trials, fair efficacy against pea aphids (*Acyrthosiphon pisum)* in a field pea trial, and poor afficacy against potato aphids (*Macrosiphum euphorbia*) in a tomato trial. Although Fulfill provided less than good to excellent efficacy in some trials, this product causes aphids to stop feeding shortly after exposure; thus, although the aphids remain alive on the plants after treatment, no further damage occurs.

Pyrethrins. Bonide Pyrethrins provided excellent efficacy against crapemyrtle aphids (*Tinocallis kahawaluokalani)* in a greenhouse crapemyrtle trial, while Pyganic provided fair efficacy against against green peach aphids (*Myzus persicae*) in a peach trial.

Pyrifluquinazon. NNI-0101 and Pyrifluquinazon 20SC provided excellent efficacy against melon aphids (*Aphis gossypii*) in 1 strawberry trial, good to excellent efficacy against green peach aphids (*Myzus persicae*) in 5 cabbage, lettuce and bell pepper trials, and poor and fair efficacy against wooly apple aphids (*Eriosoma lanigerum),* in 2 apple trials.

Pyriproxyfen. Knack provided good efficacy against melon aphids (*Aphis gossypii)* a one cantaloupe trial.

Rosemary & Peppermint Oils. Ecotrol provided no efficacy against green peach aphids (*Myzus persicae*) in a verbena trial.

Spirotetramat. Movento provided excellent efficacy against *Acyrthosipon lactucae*, lettuce aphids (*Nasanovia ribisnigri*) and foxglove aphids (*Aulacorthum solani)* in 6 lettuce trials, against melon aphids (*Aphis gossypii),* in a strawberry trial, and against rosy apple aphids (*Dysaphis plantaginea*) in an apple trial. Fair to excellent efficacy was obtained against against green peach aphids (*Myzus persicae*) in 9 trials on broccoli, cabbage, lettuce, and bell pepper. It provided good efficacy against turnip aphids (*Lipaphis pseudobrassicae)* in a Chinese cabbage trial, and against potato aphids (*Macrosiphum euphorbia*) in a tomato trial. Movento and Ultor provided excellent efficacy against spirea aphids (*Aphis spiraecola*) and rosy apple aphids (*Dysaphis plantaginea*) in 3 apple trials, and poor to excellent efficacy against wooly apple aphids (*Eriosoma lanigerum*) in 6 apple trials.

Sulfoxaflor. Closer, Sulfoxaflor and Transform provided excellent efficacy against wooly apple aphids (*Eriosoma lanigerum*) and rosy apple aphids (*Dysaphis plantaginea*) in 4 apple trials, and against lettuce aphids (*Nasanovia ribisnigri*) in a lettuce trial. Good to excellent efficacy was obtained against green peach aphids (*Myzus persicae*) in 6 trials on cabbage, bell pepper, lettuce, and potato. In 3 alfalfa trials,

good efficacy against pea aphids (*Acyrthosiphon pisum)*, and fair to good efficacy against cowpea aphids (*Aphis craccivora*) were obtained.

Thiamethoxam. Flagship provided excellent efficacy against cotton aphids (*Aphis gossypii)* and crapemyrtle aphids (*Tinocallis kahawaluokalani)* in 2 greenhouse trials on gerbera daisy and crapemyrtle. Actara provided excellent efficacy against *Acyrthosipon lactucae*, lettuce aphids (*Nasanovia ribisnigri*) and foxglove aphids (*Aulacorthum solani*) in 3 lettuce trials, against turnip aphids (*Lipaphis erysimi*) in a turnip trial, against cotton aphids (*Aphis gossypii)* in a citrus trial, and against spirea aphids (*Aphis spiraecola*) in an apple trial. It provided good to excellent efficacy against rosy apple aphids (*Dysaphis plantaginea*) in 3 apple trials. Against green peach aphids (*Myzus persicae*), it provided good to excellent efficacy in 6 potato, collard, spinach and turnip trials. It provided fair to excellent efficacy against potato aphids (*Macrosiphum euphorbia*) in 6 trials on potato and tomato, and poor to excellent efficacy against wooly apple aphids (*Eriosoma lanigerum*) in 3 apple trials. Good efficacy was obtained against melon aphids (*Aphis gossypii*) in a cantaloupe trial. Centric provided excellent efficacy against pea aphids (*Acyrthosiphon pisum*) and cowpea aphids (*Aphis craccivora)* in 2 alfalfa trials. Platinum applied as soil treatment provided excellent efficacy against lettuce aphids (*Nasanovia ribisnigri*) in a lettuce trial, and against potato aphids in a tomato trial, and fair efficacy against foxglove aphids and green peach aphids in 2 trials on lettuce and spinach.

Tolfenpyrad. NAI-2302, Torac and Tolfenpyrad provided excellent efficacy against melon aphids (*Aphis* gossypii) in a strawberry trial, and good to excellent efficacy against green peach aphids (*Myzus persicae*) in 4 broccoli, lettuce and cabbage trials.

Phytotoxicity

No phytotoxicity was observed in any crop

Appendix 1: Contributing Researchers

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