Hancock Agricultural Experiment Station, 2010 Field Day; Potato and Vegetable Insect Research

Russell L. Groves, & Scott A. Chapman
Madison, WI 53706 (608) 262-3229
groves@entomology.wisc.edu
Anders Huseth, Ken Frost,
Matthew Bodden, Ryan Curtin, Ella Floyd,
Abagail Kalscheur, Brittany Kieler, Jesse Leung

University of Wisconsin-Madison
Vegetable Crop Entomology
Extension and Research
http://www.entomology.wisc.edu/vegento/index.html

I. Full Season – Reduced-Risk, Colorado Potato Beetle Control, Large Plot Demonstration Trials (2010 Hancock Agricultural Experiment Station, Field K9)

Treatments	Active Ingredient	Application Rates	Application Number	Plot Numbers
At-plant systemic programs (with neonicotinoids):				
1) Platinum® 75SG	thiamethoxam	2.67 oz / A	1 (26 April)	(101, 201, 301)
Voliam Xpress™	chlorantraniliprole	7.0 & 5.0 fl oz / A	2 (19 & 29 July)	
2) AdmirePro®	imidacloprid	8.7 fl oz / A	1 (26 April)	(102, 202, 302)
Coragen® 1.67SC	rynaxypyr	5.0 & 5.0 fl oz / A	2 (19 & 29 July)	
3) Coragen® 1.67SC	rynaxypyr	7.0 fl oz / A	1 (26 April)	(103, 203, 303)
Actara® 25WDG	thiamethoxam	3.0 & 1.5 oz. / A	2 (19 & 29 July)	
4) Belay® 2.13SC	clothianadin	12.0 fl oz / A	1 (26 April)	(104, 204, 304)
Voliam Xpress™	chlorantraniliprole	7.0 & 5.0 fl oz / A	2 (19 & 29 July)	
5) HGW86 20SC	experimental	13.5 fl oz / A	1 (26 April)	(105, 205, 305)
Actara® 25WDG	thiamethoxam	3.0 & 1.5fl oz / A	2 (19 & 29 July)	
6) Platinum® 75SG	thiamethoxam	2.67 oz / A	1 (26 April)	(106, 206, 306)
Voliam Xpress™	chlorantraniliprole	7.0 & 5.0 fl oz / A	2 (19 & 29 July)	
7) A16901 40WG	experimental	10.0 fl oz / A	1 (26 April)	(107, 207, 307)
Voliam Xpress™	chlorantraniliprole	7.0 & 5.0 fl oz. / A	2 (19 & 29 July)	
8) Platinum® 75SG	thiamethoxam	2.67 oz / A	1 (17 May)	(108, 208, 308)
Voliam Xpress™	chlorantraniliprole	7.0 & 5.0 oz / A	2 (19 & 29 July)	
Foliar programs (with neonicotinoids):				
9) Coragen® 1.67SC	rynaxypyr	5.0 & 5.0 fl oz / A	2 (07 & 17 June)	(109, 209, 309)
Assail® 30SG	acetamiprid	4.0 & 2.5 fl oz / A	2 (19 & 29 July)	
10) Radiant® SC	spinetoram	8.0 & 6.0 fl oz / A	2 (07 & 17 June)	(110, 210, 310)
Agri-Flex® 1.55SC	abamectin + thiamethoxam	0.79 & 0.6 fl oz / A	2 (19 & 29 July)	
11) Agri-Mek® 0.15EC	abamectin	12.0 & 8.0 fl oz / A	2 (07 & 17 June)	(111, 211, 311)
Endigo® 2.06ZC	thiamethoxam + lambda-cyhalothrin	4.0 & 2.5 fl oz / A	2 (19 & 29 July)	
12) Rimon® 0.83EC	novaluron	12.0 & 8.0 fl oz / A	2 (07 & 17 June)	(112, 212, 312)
Coragen® 1.67SC	rynaxypyr	5.0 & 3.5 fl oz / A	2 (19 & 29 July)	
13) Actara® 25WDG	thiamethoxam	3.0 & 1.5 oz / A	2 (07 & 16 June)	(113, 213. 313)
Agri-Mek® 0.7SC	abamectin	2.58 & 2.0 fl oz / A	2 (19 & 29 July)	
14) Coragen® 1.67SC	rynaxypyr	5.0 & 3.5 fl oz / A	2 (07 & 17 June)	(114, 214, 314)
Radiant® SC	spinetoram	8.0 & 6.0 fl oz / A	2 (19 & 29 July)	
15) Agri-Flex® 1.55SC	abamectin + thiamethoxam	0.79 & 0.6 fl oz / A	2 (07 & 16 June)	(115, 215, 315)
Coragen® 1.67SC	rynaxypyr	5.0 & 3.5 fl oz / A	2 (19 & 29 July)	

II. Foliar Insecticide Evaluations for the Control of Colorado Potato Beetle, (2010 Hancock Agricultural Experiment Station, Hancock, WI Field C10)[1].

Treatments	Active Ingredient	Application Rate	Plot Numbers
1) UTC			(101, 201, 301, 401)
2) Leverage	imidacloprid + cyfluthrin	2.4 oz / A	(102, 202, 302, 402)
3) Leverage	imidacloprid + cyfluthrin	2.8 oz / A	(103, 203, 303, 403)
4) Endigo	thiamethoxam + (Warrior II)	3.0 oz / A	(104, 204, 304, 404)
5) HGW86 OD	experimental	3.38 oz / A	(105, 205, 305, 405)
6) HGW 86 OD	experimental	6.76 oz / A	(106, 206, 306, 406)
7) HGW 86 OD	experimental	10.1 oz / A	(107, 207, 307, 407)
8) HGW86 OD	experimental	13.5 oz /A	(108, 208, 308, 408)
9) Provado	imidicloprid	4.0 oz /A	(109, 209, 309, 409)
10) Coragen 1.67SC	rynaxypyr	3.45 oz /A	(110, 210, 310, 410)
11) Coragen 1.67SC	rynaxypyr	5.06 oz /A	(111, 211, 311, 411)
12) Coragen 1.67SC	rynaxypyr	7.0 oz / A	(112, 212, 312, 412)
13) Voliam Flexi	CTPR + thiamethoxam	4.0 oz / A	(113, 213, 313, 413)
14) Voliam Xpress	CTPR + λ-cyhalothrin	7.0 oz / A	(114, 214, 314, 414)
15) Agri Flex	abamectin + thiamethoxam	0.79 oz / A	(115, 215, 315, 415)
16)UTC			(116, 216, 316, 416)
17) Endigo	thiamethoxam + (Warrior II)	4.0 oz / A	(117, 217, 317, 417)
18) SXXX	experimental	5.2 oz / A	(118, 218, 318, 418)
19) SXXX	experimental	7.8 fl oz / A	(119, 219, 319, 419)
20)Belay	clothianadin	2.0 oz / A	(120, 220, 320, 420)
21) GWN-1970	experimental	1.33 lb / A	(121, 221, 321, 421)
22)GWN - 9883	experimental	0.545 gal / A	(122, 222, 322, 422)
23) GWN - 9883	experimental	1.09 gal / A	(123, 223, 323, 423)
24)GWN-1970 + Scorpion	experimental + dinotefuran	1.33 lb & 2.0 oz / A	(124, 224, 324, 424)
25)GWN-1970 + GWN-1986	experimental	1.0 lb & 10.0 oz / A	(125, 225, 325, 425)
26)GWN-1970 + GWN-1971	experimental	1.33 lb & 1.25 oz / A	(126, 226, 326, 426)
27)Scorpion	dinotefuran	2.0 oz / A	(127, 227, 327, 427)
28)Scorpion	dinotefuran	2.75 oz / A	(128, 228, 328, 428)
29)Brigadier	imidacloprid + bifenthrin	4.8 fl oz / A	(129, 229, 329, 429)
30) Brigadier	imidacloprid + bifenthrin	6.14 fl oz / A	(130, 230, 330, 430)
31) UTC			(131, 231, 331, 431)
32) Actara	thiamethoxam	3.0 oz / A	(132, 232, 332, 432)
33) Belay 2.13SC	clothianadin	2.8 fl oz / A	(133, 233, 333, 433)
34) Warrior II	lambda-cyhalothrin	1.92 fl oz / A	(134, 234, 334, 434)
35) Spintor 2SC	spinosad	6.0 fl oz / A	(135, 235, 335, 435)
36) Radiant	spinetoram	8.0 fl oz / A	(136, 236, 336, 436)
37) Rimon 0.83EC	novaluron	12.0 fl oz / A	(137, 237, 337, 437)
38) Temprid 31.5SC	cyfluthrin	2.8 fl oz / A	(138, 238, 338, 438)
39) Rimon + Warrior	novaluron + λ-cyhalothrin	12.0 fl oz & 3.84 oz / A	(139, 239, 339, 439)
40) Rimon + Warrior	novaluron + λ-cyhalothrin	9.0 fl oz & 2.56 oz / A	(140, 240, 340, 440)
41) Rimon	novaluron	9.0 fl oz / A	(141, 241, 341, 441)
42) Rimon + Provado	novaluron + imidacloprid	12.0 fl oz + 3.76 oz / A	(142, 242, 342, 442)
43) Rimon + Provado	novaluron + imidacloprid	9.0 fl oz + 3.76 oz / A	(143, 243, 343, 443)
44) Temprano	abamectin	8.0 fl oz / A	(144, 244, 344, 444)
45) Temprano	abamectin	12.0 fl oz / A	(145, 245, 345, 445)

[1] Foliar insecticides applied with a 6' boom operating at 30 psi delivering 20.2 gpa through 3 flat-fan nozzles (8002VS-XR) spaced 18" apart. Two applications of each foliar insecticide applied 07 and 17 June, 2010.

III. At-Plant, Systemic Insecticide Evaluations for the Control of Colorado Potato Beetle, (2010 Hancock Agricultural Experiment Station, Hancock, WI Field C25-26)[1]

Treatments	Active Ingredient	Application Rate	Plot Numbers
1) UTC			(101, 201, 301, 401)
2) A16901 40WG	experimental	6.25 oz / A	(102, 202, 302, 402)
3) A16901 40WG	experimental	10.0 oz / A	(103, 203, 303, 403)
4) A9549 75 WG	experimental	1.68 oz / A	(104, 204, 304, 404)
5) A9549 75 WG	experimental	2.66 oz / A	(105, 205, 305, 405)
6) HGW86 600FS	experimental	4.56 fl oz / A	(106, 206, 306, 406)
7) HGW86 200SC	experimental	10.3 fl oz / A	(107, 207, 307, 407)
8) HGW86 200 SC	experimental	13.7 fl oz / A	(108, 208, 308, 408)
9) Admire Pro	imidacloprid	7.0 fl oz / A	(109, 209, 309, 409)
10) Admire Pro	imidacloprid	8.7 fl oz / A	(110, 210, 310, 410)
11) Belay SC	clothianadin	12.0 fl oz / A	(111, 211, 311, 411)
12) Belay + Moncoat	clothianadin + flutolanil	0.6 fl oz & 0.75 lb / cwt	(112, 212, 312, 412)
13) V-XXX	experimental	1.3 fl oz / cwt	(113, 213, 313, 413)
14) V-XXX	experimental	1.6 fl oz / cwt	(114, 214, 314, 414)
15) V-XXX	experimental	1.9 fl oz / cwt	(115, 215, 315, 415)
16)UTC			(116, 216, 316, 416)
17)HGW86 200SC	experimental	9.0 g a.i. /100 kg	(117, 217, 317, 417)
18) HGW86 625FS	experimental	6.75 g a.i. /100 kg	(118, 218, 318, 418)
19) HGW86 625FS	experimental	9.0 g a.i. /100 kg	(119, 219, 319, 419)
20) HGW86 + Titan ST	experimental + clothianadin	6.75 & 6.25 g a.i. / 100 kg	(120, 220, 320, 420)
21) HGW86 + Titan ST	experimental + clothianadin	9.0 & 6.25 g a.i. / 100 kg	(121, 221, 321, 421)
22) HGW86 + Titan ST	experimental + clothianadin	6.75 & 3.125 g a.i. / 100 kg	(122, 222, 322, 422)
23) HGW86 + Admire Pro	experimental + imidacloprid	6.75 g a.i & 0.26 fl oz/cwt	(123, 223, 323, 423)
24) HGW86 + Admire Pro	experimental + imidacloprid	9.0 g a.i & 0.26 fl oz/cwt	(124, 224, 324, 424)
25) HGW86 600FS	experimental	9.0 g a.i. /100 kg	(125, 225, 325, 425)
26) Titan ST	clothianadin	6.25 g a.i. / A	(126, 226, 326, 426)
27) Admire Pro	imidacloprid	0.26 fl oz / cwt	(127, 227, 327, 427)
28) Admire Pro	imidacloprid	0.3 fl oz / cwt	(128, 228, 328, 428)
29) Cruiser	thiamethoxam	0.12 fl oz / cwt	(129, 229, 329, 429)
30) Cruiser	thiamethoxam	0.16 fl oz / cwt	(130, 230, 330, 430)

[1] Seed treatments were applied using a single-nozzle, overhead spray system on cut, suberized seed pieces of Russet Burbank 24 h prior to planting. In-furrow insecticide applications were applied in a 4" band over cut, suberized seed pieces placed in an open furrow using a CO_2 pressurized, backpack sprayer delivering 9.1 gpa at 30.0 psi with a single extended-range, flat-fan nozzle. Seed treatment applications were applied 25 April and in-furrow applications applied 26 April, 2010.

IV. Colorado Potato Beetle; Neonicotinoid Statewide Insensitivity Survey (8 CPB Populations [1]).

County	Site ID	(P<0.0001) (=0.05)	Estimated slope (± SE)	LD_{50} (± 95% CL)	Resistance Ratio[2]
Adams	A	(P=0.0001)	6.7% ± 0.6	0.677 (0.322 – 0.927)	0.677 / 0.029 (**23.3**)
	B	(P=0.0009)	5.2% ± 0.4	0.483 (0.218 – 0.551)	0.483 / 0.029 (**16.7**)
	C	(P=0.0287)	4.9% ± 0.4	0.411 (0.153 – 0.790)	0.411 / 0.029 (**14.2**)
Columbia	H	(P=0.0001)	9.4% ± 0.8	0.051 (0.018 – 0.088)	0.051 / 0.029 (**1.8**)
Portage	J	(P=0.0245)	7.2% ± 0.6	0.582 (0.263 – 0.774)	0.582 / 0.029 (**20.1**)
	K	(P=0.2294)	9.1% ± 0.8	0.693 (0.403 – 1.043)	0.693 / 0.029 (**23.9**)
Waushara	P	(P=0.0761)	6.6% ± 0.6	1.32 (0.661 – 1.841)	1.32 / 0.029 (**45.5**)
	Q	(P=0.0205)	8.2% ± 0.7	0.942 (0.783 – 1.689)	0.942 / 0.029 (**32.5**)

[1] Special thanks to all cooperating growers and pest management practitioners for their assistance with the CPB insensitivity project (Mr. Randy Van Haren Pest Pros Inc., Plainfield, WI & Mr. Andy Merry, Antigo, WI, Mr. Anders Huseth, Department of Entomology)

[2] Resistance ratio estimates calculated against a New Jersey reference control strain of Colorado potato beetle adults (LD_{50} = 0.029).

V. 2010, Additional Vegetable Insect Research.

I. Onion thrips *(Thrips tabaci):*

- Controlling onion thrips using adjusted action thresholds and novel pest management products to meet resistance management guidelines and provide full-season control. Experiments also focusing on fungicide tank mixes and associated reductions in insect control. Experiments performed in cooperation with Shiprock Muck Farms, Coloma, WI.

II. European corn borer (*Ostrinia nubilalis*) and corn earworm (*Helicoverpa zea*):

- Improved application techniques for the control of European corn borer. Investigating the influence of seed treatment and soil-applied, water-soluble anthranilic diamides on the control of ECB in snap beans, sweet corn, and cabbage. Experiments performed in cooperation with Del Monte Foods and DuPont Crop Protection.

III. Mint bud mite (*Floridotarsonemus* spp.):

- Refining pest management recommendations and generating efficacy data for the control of mite and insect pests in peppermint. Experiments performed in cooperation with Bayer Crop Science in support of a 2009 A-priority rating of spiromesifen (Oberon®) under review with the Inter-regional Research Project 4, Minor Use Pesticide Registration.

IV. Striped cucumber beetle (*Acalymma vittatum*):

- Developing non-chemical, cultural pest management recommendations for the control of key insect and mite pests in cucurbit crops. Experiments performed in cooperation with Wisconsin Cooperative Extension Agents Bill Halfman, Monroe County, WI and supported by EPA Region V, American Farmland Trust.

V. Colorado Potato Beetle (*Leptinotarsa decemlineata*):

The long-term goal of this project is to refine and even replace current insect management programs in key eastern US production regions – which rely on frequent foliar applications of broad spectrum insecticides – with an economically viable, reduced-risk system. (A) Compare the response of pest and beneficial arthropods, crop yield, and economic returns associated with reduced-risk practices versus conventional foliar spraying of insecticides in fruiting vegetables and cucurbits in a diversity of production systems, and (2) Determine the effect of different types of systemic insecticides applied to the roots of crops on the population biology and foraging behavior of nativeand domestic pollinators as well as non-target beneficial arthropods.

VI. Potato virus Y (PVY):

- Development of comprehensive strategies to manage *Potato virus Y* in potato and eradicate the tuber necrotic variants recently introduced into the United States.

a) Assist seed certification agencies to amend current practices and improve their ability to detect, monitor and eliminate PVY from seed stocks.
b) Assist breeding programs to develop improved methods to screen for PVY resistance and symptom expression.
c) Assist growers to develop cost effective, on-farm virus control strategies.