

## Hancock Agricultural Experiment Station, 2008 Field Day; Potato and Vegetable Insect Research

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### I. Colorado Potato Beetle; Neonicotinoid Statewide Insensitivity Among 22 Populations (Fig. 1)<sup>1</sup>.

County	Site ID	(P<0.0001) (=0.05)	Estimated slope (± SE)	LD <sub>50</sub> (± 95% CL)	Resistance Ratio <sup>2</sup>
Adams	A	(P=0.0088)	9.9% ± 1.9	0.055 (0.038 – 0.061)	0.055 / 0.042 (1.3)
	B	(P=0.0231)	8.1% ± 1.6	0.076 (0.049 – 0.098)	0.076 / 0.042 (1.8)
	C	(P=0.0877)	7.7% ± 2.2	0.188 (0.111 – 0.265)	0.188 / 0.042 (4.5)
	D	(P=0.6988)	5.0% ± 0.8	0.855 (0.683 – 0.919)	0.855 / 0.042 (21.1)
	E	(P=0.0923)	8.0% ± 1.6	0.233 (0.174 – 0.288)	0.233 / 0.042 (5.6)
	F	(P=0.7249)	10.2% ± 1.8	1.92 (1.131 – 2.639)	1.92 / 0.042 (45.7)
	G	(P=0.3341)	6.9% ± 1.2	0.982 (0.584 – 1.421)	0.982 / 0.042 (23.4)
Columbia	H	(P=0.0052)	10.6% ± 0.9	0.049 (0.031 – 0.067)	0.049 / 0.042 (1.2)
Langlade	I	(P=0.0191)	8.5% ± 1.3	0.035 (0.022 – 0.048)	0.035 / 0.042 (0.8)
Portage	J	(P=0.0245)	9.9% ± 1.6	0.078 (0.056 – 0.099)	0.078 / 0.042 (1.9)
	K	(P=0.2294)	7.0% ± 1.8	0.771 (0.553 – 0.961)	0.771 / 0.042 (18.4)
	L	(P=0.3493)	6.8% ± 2.4	0.561 (0.388 – 0.734)	0.561 / 0.042 (13.4)
	M	(P=0.0454)	8.8% ± 2.6	0.121 (0.091 – 0.144)	0.121 / 0.042 (2.9)
	N	(P=0.0178)	9.2% ± 1.8	0.069 (0.051 – 0.088)	0.069 / 0.042 (1.6)
	O	(P=0.0562)	6.9% ± 1.2	0.553 (0.461 – 0.656)	0.553 / 0.042 (13.1)
	Waushara	P	(P=0.0761)	7.4% ± 1.6	0.432 (0.309 – 0.562)
Q		(P=0.0205)	10.9% ± 1.2	0.045 (0.032 – 0.057)	0.045 / 0.042 (1.1)
R		(P=0.1121)	5.2% ± 1.7	0.761 (0.534 – 1.004)	0.761 / 0.042 (18.1)
S		(P=0.2984)	6.0% ± 2.2	0.882 (0.593 – 1.117)	0.882 / 0.042 (21.0)
T		(P=0.3258)	5.6% ± 2.1	0.724 (0.540 – 0.909)	0.724 / 0.042 (17.2)
U		(P=0.0148)	10.1% ± 0.9	0.091 (0.68 – 0.113)	0.091 / 0.042 (2.2)
V		(P=0.0302)	8.5% ± 1.3	0.061 (0.046 – 0.084)	0.061 / 0.042 (1.5)

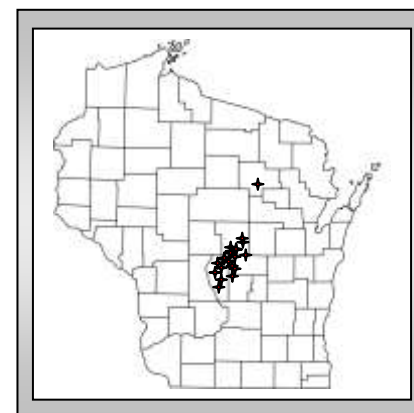


Figure 1. Colorado potato beetle collection sites for neonicotinoid insensitivity.

<sup>1</sup> 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 Huseeth, Department of Entomology)  
<sup>2</sup> Resistance ratio estimates calculated against a New Jersey reference control strain of Colorado potato beetle adults (LD<sub>50</sub> = 0.042).

### II. Full Season – Reduced-Risk, Colorado Potato Beetle Control, Large Plot Demonstration Trials (Hancock Agricultural Experiment Station, Field K25)

Treatments	Active Ingredient	Application Rates	Application Number	Plot Numbers
<i>At-plant systemic programs (with neonicotinoids):</i>				
1) Cruiser <sup>®</sup> FS Volium Xpress	thiamethoxam rynaxypyr	0.16 oz / cwt 7.0 oz / A	1 (at-plant) 2 (14 days apart)	(101, 201, 301)
2) AdmirePro <sup>®</sup> Alverde <sup>™</sup> SC	imidacloprid metaflumizone	8.7 fl oz / A 4.5 fl oz. / A	1 (at-plant) 2 (14 days apart)	(102, 202, 302)
3) Platinum <sup>®</sup> Coragen 1.67SC	thiamethoxam chlorantraniliprole	8.0 fl oz / A 3.5 fl oz. / A	1 (at-plant) 2 (14 days apart)	(103, 203, 303)
4) Belay <sup>®</sup> 2.13SC Coragen 1.67SC	clothianadin chlorantraniliprole	8.7 fl oz / A 5.0 & 3.5 fl oz. / A	1 (at-plant) 2 (14 days apart)	(104, 204, 304)
5) Belay <sup>®</sup> (seed trt) Alverde <sup>™</sup> SC	clothianadin metaflumizone	8.7 fl oz / A 4.5 fl oz. / A	1 (at-plant) 2 (14 days apart)	(105, 205, 305)
<i>Foliar programs (without neonicotinoids):</i>				
6) Radiant <sup>®</sup> SC Coragen <sup>®</sup> 1.67SC	spinetoram chlorantraniliprole	8.0 & 6.0 fl oz / A 5.0 & 3.5 fl oz. / A	2 (7 days apart) 2 (14 days apart)	(106, 206, 306)
7) Rimon <sup>®</sup> 0.83EC Alverde <sup>™</sup> SC	novaluron metaflumizone	12.0 & 8.0 fl oz / A 4.5 fl oz. / A	2 (7 days apart) 2 (14 days apart)	(107, 207, 307)
13) Novodor <sup>®</sup> FC Entrust <sup>®</sup> WP	<i>Bacillus thuringiensis</i> subsp. <i>tenebrionis</i> spinetoram	2.75, 2.0, and 2.0 L / A 2.0 & 2.0 oz / A	3 (1, 3, and 7 days apart) 2 (7 days apart)	(113, 213, 313)
<i>Foliar programs (with neonicotinoids):</i>				
8) Agri-Mek <sup>®</sup> 0.15EC Endigo <sup>®</sup> ZC	abamectin thiamethoxam + lambda-cyhalothrin	12.0 & 8.0 fl oz / A 4.5 & 3.0 oz / A	2 (7 days apart) 2 (14 days apart)	(108, 208, 308)
9) Alverde <sup>™</sup> SC Assail <sup>®</sup> 30SG	metaflumizone acetamiprid	4.5 fl oz. / A 4.0 oz / A	2 (14 days apart) 2 (14 days apart)	(109, 209, 309)
10) Assail <sup>®</sup> 30SG Coragen <sup>®</sup> 1.67SC	acetamiprid chlorantraniliprole	4.0 oz / A 3.5 & 3.5 fl oz. / A	2 (14 days apart) 2 (14 days apart)	(110, 210, 310)
11) Assail <sup>®</sup> 30SG + Bifenture <sup>®</sup> EC Coragen <sup>®</sup> 1.67SC	acetamiprid + bifenthrin chlorantraniliprole	4.0 oz + 2.5 fl oz / A 3.5 & 3.5 fl oz. / A	2 (14 days apart) 2 (14 days apart)	(111, 211, 311)
12) Assail <sup>®</sup> 30SG + KFD 47-01ME Coragen <sup>®</sup> 1.67SC	acetamiprid + lambda-cyhalothrin chlorantraniliprole	4.0 oz + 3.5 fl oz / A 3.5 & 3.5 fl oz. / A	2 (14 days apart) 2 (14 days apart)	(112, 212, 312)
14) Actara <sup>®</sup> 25WDG Volium Xpress	thiamethoxam rynaxypyr	3.0 oz / A 7.0 oz / A	2 (14 days apart) 2 (14 days apart)	(114, 214, 314)
15) Agri-Mek <sup>®</sup> 0.15EC Volium Flexi <sup>™</sup>	abamectin chlorantraniliprole + thiamethoxam	12.0 & 8.0 fl oz / A 7.0 & 5.0 oz / A	2 (7 days apart) 2 (14 days apart)	(115, 215, 315)

**III. Maternal Effects of Novaluron (Rimon® 0.83EC) on Colorado Potato Beetle, (Arlington Agricultural Experiment Station, Arlington, WI).**

Mean Proportion of Viable Egg Masses

Treatments	Application Rates	Application Number	Plot Numbers	16 June	23 June	30 June	7 July	14 July	Mean
1) Rimon® 0.83EC	12 fl oz. / A	2 (14 days apart)	(101, 201, 301, 401)	0.8	0.65	0.68	0.60	X.X	<b>0.68</b>
2) Rimon® 0.83EC + Alverde™ 240SC	6 fl oz. / A 2.4 fl oz. / A	2 (14 days apart) 2 (14 days apart)	(102, 202, 302, 402)	0.78	0.6	0.85	0.53	X.X	<b>0.69</b>
3) Alverde™ 240SC	4.75 fl oz. / A	2 (14 days apart)	(103, 203, 303, 403)	1.00	0.95	1.00	0.95	X.X	<b>0.98</b>
4) Rimon® 0.83EC	6 fl oz. / A	4 (7 days apart)	(104, 204, 304, 404)	0.88	0.68	0.38	0.33	X.X	<b>0.57</b>
5) UTC			(105, 205, 305, 405)	0.95	1.00	1.00	0.98	X.X	<b>0.98</b>

**IV. Foliar Insecticide Evaluations for the Control of Colorado Potato Beetle, (Hancock Agricultural Experiment Station, Hancock, WI Fields C4-6)<sup>1</sup>.**

Treatments	Active Ingredient	Application Rate	Plot Numbers	Treatments	Active Ingredient	Application Rate	Plot Numbers
1) Brigadier	imidacloprid + bifenthrin	4.8 oz. / A	(101, 201, 301, 401)	31) Rimon	novaluron	12 fl oz. / A	(131, 231, 331, 431)
2) Brigadier	imidacloprid + bifenthrin	6.2 oz. / A	(102, 202, 302, 402)	32) Agri-Mek	abamectin	8.0 fl oz. / A	(132, 232, 332, 432)
3) HGW 86 OD	experimental	0.044 lb a.i. / A	(103, 203, 303, 403)	33) Agri-Mek	abamectin	12.0 fl oz. / A	(133, 233, 333, 433)
4) HGW 86 OD		0.088 lb a.i. / A	(104, 204, 304, 404)	34) Vydate	oxamyl	4 pt. / A	(134, 234, 334, 434)
5) HGW 86 OD		0.134 lb a.i. / A	(105, 205, 305, 405)	35) SpinTor	spinosad	4.5 fl oz. / A	(135, 235, 335, 435)
6) HGW 86 OD + MSO		0.088 lb a.i. / A	(106, 206, 306, 406)	36) SpinTor	spinosad	6.0 fl oz. / A	(136, 236, 336, 436)
7) HGW 86 SE	experimental	0.088 lb a.i. / A	(107, 207, 307, 407)	37) UTC			(137, 237, 337, 437)
8) Coragen 1.67 SC	rynaxypyr	3.5 fl oz/A	(108, 208, 308, 408)	38) Radiant	spinetoram	6.0 fl oz. / A	(138, 238, 338, 438)
9) Coragen 1.67 SC	rynaxypyr	5.0 fl oz/A	(109, 209, 309, 409)	39) Radiant	spinetoram	8.0 fl oz. / A	(139, 239, 339, 439)
10) Alverde	metaflumizone	4.5 fl oz/A	(110, 210, 310, 410)	40) Thiodan	endosulfan	1.33 qt. / A	(140, 240, 340, 440)
11) Alverde	metaflumizone	6.0 fl oz/A	(111, 211, 311, 411)	41) Imidan	phosmet	1.33 lb / A	(141, 241, 341, 441)
12) Belay 16 WSG	clothianadin	1.8 fl oz/A	(112, 212, 312, 412)	42) A15645	experimental	4.0 oz. / A	(142, 242, 342, 442)
13) Belay 16 WSG	clothianadin	2.8 fl oz/A	(113, 213, 313, 413)	43) A15397	experimental	5.0 fl oz. / A	(143, 243, 343, 443)
14) UTC			(114, 214, 314, 414)	44) A15397	experimental	7.0 fl oz. / A	(144, 244, 344, 444)
15) Assail	acetamiprid	4.0 oz. / A	(115, 215, 315, 415)	45) A15397	experimental	8.9 fl oz. / A	(145, 245, 345, 445)
16) Actara	thiamethoxam	1.5 oz. / A	(116, 216, 316, 416)	46) Endigo ZC	thiamethoxam+(Warrior)	3.5 fl oz. / A	(146, 246, 346, 446)
17) Provado	imidacloprid	3.75 fl oz. / A	(117, 217, 317, 417)	47) Mustang MAX	zeta-cypermethrin	4.7 fl oz. / A	(147, 247, 347, 447)
18) Belay 50 WDG	clothianadin	1.5 oz. / A	(118, 218, 318, 418)	48) Movento	spirotriamet	5.0 fl oz. / A	(148, 248, 348, 448)
19) Belay 50 WDG	clothianadin+(Warrior)	1.5 oz. / A	(119, 219, 319, 419)	49) Venom	dinotefuran	1.0 oz. / A	(149, 249, 349, 449)
20) Belay 16 WSG	clothianadin	2.8 fl oz/A	(120, 220, 320, 420)	50) Venom	dinotefuran	1.5 oz. / A	(150, 250, 350, 450)
21) Belay 16 WSG	clothianadin+(Warrior)	2.8 fl oz/A	(121, 221, 321, 421)	51) Novodor	<i>B.t. tenebrionis</i>	2.75 L / A	(151, 251, 351, 451)
22) Leverage	imidacloprid + Baythroid	3.75 fl oz. / A	(122, 222, 322, 422)	52) Novodor	<i>B.t. tenebrionis</i>	2.0 L / A	(152, 252, 352, 452)
23) Endigo ZC	thiamethoxam+(Warrior)	2.74 fl oz. / A	(123, 223, 323, 423)				
24) XXXX	experimental	15.3 fl oz. / A	(124, 224, 324, 424)				
25) XXXX	experimental	30.6 fl oz. / A	(125, 225, 325, 425)				
26) XXXX	experimental	45 g a.i. / A	(126, 226, 326, 426)				
27) XXXX	experimental	90 g a.i. / A	(127, 227, 327, 427)				
28) UTC			(128, 228, 328, 428)				
29) Asana XL	esfenvalerate + PBO	9.7 fl oz. / A	(129, 229, 329, 429)				
30) Rimon	novaluron	9.0 fl oz. / A	(130, 230, 330, 430)				

<sup>1</sup> Foliar insecticides applied with a 6' boom operating at 30 psi delivering 24.9 gpa through 3 flat-fan nozzles (800ZVS-XR) spaced 18" apart. Two applications of each foliar insecticide applied 16 and 23 June, 2008.**V. At-Plant, Systemic Insecticide Evaluations for the Control of Colorado Potato Beetle, (Hancock Agricultural Experiment Station, Hancock, WI Field E 21)<sup>1</sup>.**

Treatments	Active Ingredient	Application Rate	Plot Numbers	Treatments	Active Ingredient	Application Rate	Plot Numbers
1) UTC			(101, 201, 301, 401)	24) Belay	clothianadin	0.6 fl oz. / cwt	(124, 224, 324, 424)
2) Maxim	fludioxonil		(102, 202, 302, 402)	25) Belay (+ Maxim)	clothianadin	0.6 fl oz. / cwt	(125, 225, 325, 425)
3) Tops MZ	thiophanate / mancozeb		(103, 203, 303, 403)	26) Belay (+ TopsMZ)	clothianadin	0.6 fl oz. / cwt	(126, 226, 326, 426)
4) HGW 86	experimental	0.066 lb a.i. / A	(104, 204, 304, 404)	27) Belay (+ Mancozeb)	clothianadin	0.6 fl oz. / cwt	(127, 227, 327, 427)
5) HGW 86	experimental	0.134 lb a.i. / A	(105, 205, 305, 405)	28) Belay (+ Maxim MZ)	clothianadin	0.6 fl oz. / cwt	(128, 228, 328, 428)
6) HGW 86	experimental	0.176 lb a.i. / A	(106, 206, 306, 406)	29) Belay (+ V10243)	clothianadin (+exper)	0.4 fl oz. / cwt	(129, 229, 329, 429)
7) HGW 86	experimental	3.2 g a.i. / cwt	(107, 207, 307, 407)	30) Belay (+ V10243)	clothianadin (+exper)	0.6 fl oz. / cwt	(130, 230, 330, 430)
8) Regent	fipronil	3.2 fl oz. / A	(108, 208, 308, 408)	31) Belay 16WG	clothianadin	12 fl oz. / A	(131, 231, 331, 431)
9) Regent	fipronil (Maxim)	3.2 fl oz. / A	(109, 209, 309, 409)	32) Belay 16WG (row mark)	clothianadin	8 fl oz. / A	(132, 232, 332, 432)
AdmirePro	imidacloprid	8.7 fl oz. / A		Belay 16WG (in-furrow)	clothianadin	10 fl oz. / A	
10) Regent	fipronil (Tops MZ)	0.32 fl oz. / cwt	(110, 210, 310, 410)	33) Belay (1 <sup>st</sup> hilling)	clothianadin	4.8 fl oz. / A	(133, 233, 333, 433)
11) Belay SC	clothianadin	7.2 fl oz. / A	(111, 211, 311, 411)	Belay (2 <sup>nd</sup> hilling)	clothianadin	4.8 fl oz. / A	
12) Belay SC	clothianadin	8.4 fl oz. / A	(112, 212, 312, 412)	34) Tops MZ Gaucho	imidacloprid	12.0 oz. / cwt	(134, 234, 334, 434)
13) Belay SC	clothianadin	9.0 fl oz. / A	(113, 213, 313, 413)	35) Tops MZ Gaucho	imidacloprid	16.0 oz. / cwt	(135, 235, 335, 435)
14) Belay SC	clothianadin	9.6 fl oz. / A	(114, 214, 314, 414)	36) Belay 16WG	clothianadin	18 fl oz. / A	(136, 236, 336, 436)
15) Belay SC	clothianadin	10.8 fl oz. / A	(115, 215, 315, 415)	37) Poncho	clothianadin	0.16 fl oz. / cwt	(137, 237, 337, 437)
16) AdmirePro	imidacloprid	8.7 fl oz. / A	(116, 216, 316, 416)	38) Poncho	clothianadin	0.32 fl oz. / cwt	(138, 238, 338, 438)
17) AdmirePro	imidacloprid	7.0 fl oz. / A	(117, 217, 317, 417)	39) Venom 70WG	dinotefuran	7.0 oz. / A	(139, 239, 339, 439)
18) Admire	imidacloprid	0.64 fl oz. / cwt	(118, 218, 318, 418)	40) Platinum (1 <sup>st</sup> hilling)	thiamethoxam	4.0 fl oz. / A	(140, 240, 340, 440)
19) UTC			(119, 219, 319, 419)	Platinum (2 <sup>nd</sup> hilling)	thiamethoxam	4.0 fl oz. / A	
20) Platinum	thiamethoxam	6.0 fl oz. / A	(120, 220, 320, 420)	41) AdmirePro (1 <sup>st</sup> hilling)	imidacloprid	4.0 fl oz. / A	(141, 241, 341, 431)
21) Platinum	thiamethoxam	6.5 fl oz. / A	(121, 221, 321, 421)	AdmirePro (2 <sup>nd</sup> hilling)	imidacloprid	4.7 fl oz. / A	
22) Platinum	thiamethoxam	8.0 fl oz. / A	(122, 222, 322, 422)	42) Belay (2 <sup>nd</sup> hilling)	clothianadin	9.6 fl oz. / A	(142, 242, 342, 442)
23) CruiserMaxx	thiamethoxam	0.16 fl oz. / cwt	(123, 223, 323, 423)	43) UTC			(143, 243, 343, 443)

<sup>1</sup> Seed treatments were applied using an overhead spray system at the Hancock Agricultural Research Station 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<sub>2</sub> pressurized, backpack sprayer delivering 5 gpa at 24.9 psi with a single hollow-cone nozzle (TXVS-6). Seed treatment applications were applied 23 April and in-furrow applications applied 24 April, 2008.**VI. 2007, 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 performed in cooperation with Gumz Muck Farms, Endeavor, 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 soil-applied, water-soluble anthrillid diamides on the control of ECB in snap beans, sweet corn, and cabbage. Experiments performed in cooperation with Dean Kincaid Farms, Palmyra, WI.

