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FINAL REPORT

Efficacy of Soil and Foliar Insecticides for the
Control of Wireworms and Colorado potato
beetle in Potatoes

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EFFICACY OF INSECTICIDES FOR THE CONTROL OF WIREWORMS AND COLORADO POTATO BEETLE IN POTATOES IN VIRGINIA

EXPERIMENTAL DESIGN, MATERIALS AND PROCEDURES:

Location	ESAREC, Painter, VA
Plant Date	14 April 2014
Variety	'Superior'
Experimental Design	11 treatments arranged in a RCB design with 4 replicates
Plot Size	2 rows x 20 ft; no guard rows

Plot Maintenance	All plots were maintained according to standard commercial practices. Treatments 1, 2, 3, 4, 5, 6 and 7 were treated with Coragen (5 fl oz / acre) on 2 Jun due to high Colorado potato beetle pressure.
Treatment Application Method	All in-furrow and post-emergence treatments were applied in 900 ml of water at 19.8 GPA on 14 Apr using a single nozzle boom equipped with an 8003 even flat spray tip powered by a CO ₂ backpack sprayer at 30psi. Furrows were cut using a commercial potato planter without the coulters on. All foliar treatments were applied with a 4-nozzle boom equipped with 110003VS spray tips spaced 20" apart spraying 2 rows at a time and powered by a CO ₂ backpack sprayer at 40psi delivering 38 GPA.
Treatment Dates	14 Apr (in-furrow); 5 May (Post-emergence); 2 Jun (Foliar)

Target Pests	Colorado potato beetle: <i>Leptinotarsa decemlineata</i> ; Wireworms: <i>Melanotus communis</i>
Data Collection	23 May: number of potato stems per one row (stand count) 29 May: all CPB life stages per 10 stems 2 Jun: % defoliation per 2-row plot 13 Jun: number of potato leafhopper nymphs per 20 compound leaves 23 Jun, 10 Jul: Number of wireworm damaged tubers per 50 tubers 23Jun: Number of wireworm holes per 50 tubers 10 Jul: All tubers were harvested and weighed

All data were analyzed using analysis of variance procedures. Means were separated using Tukey's HSD at the 0.05 level of significance. Data were sqrt transformed to normalize when necessary.

RESULTS:

Table 1. EFFICACY OF INSECTICIDES FOR THE CONTROL OF WIREWORMS AND COLORADO POTATO BEETLE IN POTATOES IN VIRGINIA; ESAREC, Painter, VA 2014 (foliar insect counts)

Treatment	Rate / acre	Mean no. Colorado potato beetles / 10 stems		% defoliation 2-Jun	Mean no. potato leafhopper nymphs / 20 compound leaves
		small larvae	large larvae		
1. Untreated Control		141.3 a	17.0 ab	28.8 a	4.0
2. Regent 4SC (in-furrow)	3.2 fl oz	26.8 cd	5.0 ab	1.3 cd	0.8
3. Levo (in-furrow)	42 fl oz	67.5 bc	14.8 ab	25.0 a	1.5
4. Levo + Capture LFR (post-emergence)	42 fl oz + 25.5 fl oz	95.5 ab	25.8 a	29.5 a	2.3
5. Levo (post-emergence)	42 fl oz	68.5 bc	21.3 ab	31.3 a	4.5
6. Movento 240 + NIS (foliar)	5 fl oz + 0.5% v/v	59.0 bc	15.0 ab	17.5 ab	0.0
7. Mocap 4EC (in-furrow)	4.4 fl oz / 1000 row ft	77.3 d	13.0 ab	17.5 abc	0.8
8. Verimark (in-furrow)	13.5 fl oz	0.8 bcd	0.0 b	0.0 d	0.0

9. Platinum 75 (in-furrow)	2.67 oz	5.0 bc	13.0 ab	10.0 abcd	0.0
10. Admire Pro (in-furrow)	8.7 fl oz	0.0 d	3.0 ab	2.5 bcd	0.0
11. Brigadier (in-furrow)	25.5 fl oz	1.8 d	0.0 b	0.0 d	0.0
<i>P-Value from ANOVA</i>		<0.0001	0.0117	<0.0001	ns

Table 2. EFFICACY OF INSECTICIDES FOR THE CONTROL OF WIREWORMS AND COLORADO POTATO BEETLE IN POTATOES IN VIRGINIA; ESAREC, Painter, VA 2014 (Stand and harvest data)

Treatment	Rate / acre	Stand	% wireworm and grub damaged tubers		Mean total number of wireworm holes in tubers	Total yield (in lbs)
			23 Jun	10 Jul		
1. Untreated Control		103.5	11.0 ab	5.5	6.0 ab	14.5 ab
2. Regent 4SC (in-furrow)	3.2 fl oz	85.5	4.5 ab	4.5	2.3 b	18.4 ab
3. Levo (in-furrow)	42 fl oz	102.8	2.0 b	7.0	1.5 b	14.6 ab
4. Levo + Capture LFR (post-emergence)	42 fl oz + 25.5 fl oz	78.3	4.0 ab	7.0	1.5 b	11.9 ab
5. Levo (post-emergence)	42 fl oz	104.3	13.5 a	11.0	9.0 a	14.4 ab
6. Movento 240 + NIS (foliar)	5 fl oz + 0.5% v/v	86.0	7.5 ab	9.5	4.8 ab	14.2 ab
7. Mocap 4EC (in-furrow)	4.4 fl oz / 1000 row ft	108.5	1.5 b	4.0	1.8 b	20.0 a
8. Verimark (in-furrow)	13.5 fl oz	101.0	3.5 ab	6.5	1.8 b	19.5 ab
9. Platinum 75 (in-furrow)	2.67 oz	89.5	7.0 ab	9.5	3.8 ab	10.1 b
10. Admire Pro (in-furrow)	8.7 fl oz	91.5	4.5 ab	5.0	2.3 b	17.0 ab
11. Brigadier (in-furrow)	25.5 fl oz	98.8	3.0 ab	2.5	1.5 b	18.3 ab
<i>P-Value from ANOVA</i>		ns	0.0289	ns	0.0067	0.0173

RAW DATA:

REP	TRT	SL29MAY	LL29MAY	STAND	DEF3JUN	PLH13J	HOLE23J	WWDAM23J	TOTYIELD	WWDAM10J	GrubDAM10J	TOTAL DAMAGE
101	1	249	51	134	60	2	9	9	6.8	5	0	5
102	2	45	8	51	0	2	2	2	10.8	2	1	3
103	3	74	20	94	40	4	0	0	9.5	0	2	2
104	4	103	57	66	60	0	2	2	7.1	4	0	4
105	5	83	25	132	35	3	8	6	7.4	2	0	2
106	6	52	12	84	20	0	8	6	12.15	3	1	4
107	7	112	16	104	30	1	0	0	14.9	1	1	2
108	8	1	0	96	0	0	1	1	18.3	2	2	4
109	9	80	17	122	10	0	3	3	12.1	7	4	11
110	10	0	0	99	0	0	4	4	15.9	1	2	3
111	11	0	0	100	0	0	2	2	15.9	1	0	1
20	5	64	16	91	50	2	11	8	15.9	3	0	3

1												
20 2	2	16	4	81	5	1	2	2	17.5	0	0	0
20 3	7	52	18	112	30	0	6	2	24.5	1	1	2
20 4	4	89	28	81	50	5	0	0	18.8	0	0	0
20 5	3	62	15	98	30	0	0	0	17.8	2	0	2
20 6	8	0	0	114	0	4	0	0	19.4	3	0	3
20 7	1	147	8	110	20	7	0	0	23.3	2	0	2
20 8	10	0	11	132	10	0	1	1	25	3	0	3
20 9	6	82	11	99	20	0	1	1	18.2	3	2	5
21 0	11	7	0	104	0	0	0	0	21.8	0	1	1
21 1	9	42	9	100	15	0	10	9	12.9	6	0	6
30 1	8	2	0	78	0	2	1	1	17.9	1	0	1
30 2	11	0	0	97	0	0	3	3	16.5	2	1	3
30 3	3	62	13	96	25	1	3	3	11.7	5	2	7
30 4	7	83	3	102	5	0	1	1	18.6	3	0	3
30 5	4	103	0	50	5	0	3	3	2.9	2	1	3
30 6	1	107	1	59	5	1	11	9	10.6	1	0	1
30 7	6	46	17	81	10	0	4	4	14	5	3	8
30 8	5	79	22	92	20	2	8	6	18.1	5	2	7
30 9	10	0	1	37	0	0	2	2	6.6	1	2	3
31 0	9	23	0	43	5	0	1	1	4.8	0	0	0
31 1	2	18	0	100	0	0	2	2	20.9	0	0	0
40 1	8	0	0	116	0	1	5	5	22.5	5	0	5
40 2	2	28	8	110	0	0	3	3	24.4	4	2	6
40 3	5	48	22	102	20	11	9	7	16	8	2	10
40 4	7	62	15	116	5	2	0	0	21.1	1	0	1
40 5	3	72	11	123	5	1	3	1	19.4	3	0	3
40 6	10	0	0	98	0	0	2	2	20.6	1	0	1
40 7	9	67	26	93	10	0	1	1	10.5	2	0	2
40 8	1	62	8	111	30	6	4	4	17.1	2	1	3
40 9	6	56	20	80	20	0	6	4	12.6	2	0	2
41 0	4	87	18	116	3	4	1	1	18.8	5	2	7
41 1	11	0	0	94	0	0	1	1	19	0	0	0

WEATHER DATA:

2014 Temperature and Rainfall Data

Painter, VA

April						May						June					
Day	Temperature			Rain	Snow	Day	Temperature			Rain	Snow	Day	Temperature			Rain	Snow
	Max.	Min.	Mean				Max.	Min.	Mean				Max.	Min.	Mean		
1	57	34	45.5	0		1	76	61	68.5	0.29		1	68	49	58.5	0	
2	67	41	54.0	0		2	76	58	67.0	0		2	74	45	59.5	0	
3	68	46	57.0	0		3	70	50	60.0	0		3	84	59	71.5	0	
4	68	47	57.5	0		4	78	50	64.0	0		4	86	64	75.0	0	
5	63	47	55.0	0.02		5	78	49	63.5	0		5	82	69	75.5	0.18	
6	61	36	48.5	0		6	67	50	58.5	0.49		6	77	59	68.0	0	
7	59	38	48.5	0.98		7	69	48	58.5	0		7	80	55	67.5	0	
8	67	55	61.0	0.02		8	84	59	71.5	0		8	82	57	69.5	0	
9	63	46	54.5	0		9	85	57	71.0	0		9	81	65	73.0	0	
10	66	39	52.5	0		10	82	62	72.0	0		10	87	70	78.5	0.06	
11	77	53	65.0	0		11	81	64	72.5	0.45		11	86	69	77.5	0.01	
12	77	54	65.5	0		12	83	57	70.0	0		12	76	69	72.5	0.67	
13	77	52	64.5	0		13	90	71	80.5	0		13	83	68	75.5	0.11	
14	73	60	66.5	0		14	71	59	65.0	0		14	80	69	74.5	0.19	
15	70	61	65.5	0.3		15	78	62	70.0	0		15	78	54	66.0	0	
16	67	35	51.0	0.79		16	76	60	68.0	3.62		16	84	60	72.0	0	
17	51	32	41.5	0		17	68	55	61.5	0		17	92	71	81.5	0	
18	53	36	44.5	0		18	69	49	59.0	0		18	94	77	85.5	0	
19	58	43	50.5	0		19	69	45	57.0	0		19	94	76	85.0	0	
20	58	47	52.5	0		20	76	53	64.5	0		20	85	69	77.0	0.7	
21	65	39	52.0	0		21	82	62	72.0	0.02		21	81	64	72.5	0.02	
22	76	40	58.0	0		22	82	63	72.5	0.25		22	78	68	73.0	0	
23	73	52	62.5	0.01		23	82	63	72.5	0.54		23	77	60	68.5	0	
24	60	46	53.0	0		24	75	57	66.0	0		24	81	59	70.0	0	
25	63	39	51.0	0		25	79	56	67.5	0		25	84	73	78.5	0.05	
26	72	52	62.0	1.47		26	84	59	71.5	0		26	86	76	81.0	0	
27	73	51	62.0	0.02		27	87	71	79.0	0		27	85	69	77.0	0	
28	64	42	53.0	0		28	88	67	77.5	0.08		28	79	63	71.0	0	
29	54	47	50.5	0.48		29	85	57	71.0	0.65		29	79	57	68.0	0	
30	68	53	60.5	0.21		30	69	57	63.0	0.09		30	83	61	72.0	0	
						31	75	54	64.5	0							
				55.5	4.30					67.7	6.48					73.2	1.99
74-Year Average			3.15			3.38			3.75								
Difference			1.15			3.10			-1.76								

