

## IMPACT OF METHOD OF APPLICATION ON EFFICACY OF INESTICIDES FOR CONTROL OF GREEN PEACH APHID IN POTATOES

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The potato industry suffers from a wide array of insect/mite pest problems such as green peach aphid, Colorado potato beetle, wireworms and two-spotted spider mites. Recently the Washington potato industry has seen “new” insect pest problems emerge including thrips and three different worm species in the mid-1990s, beet leafhopper in 2002, potato tuberworm in 2005 and potato psyllid in 2011. Although some of these pests have some non-chemical or IPM-based tactics (border sprays for CPB, avoidance of pyrethroid insecticides during certain windows to avoid flaring aphids and mites), insecticides remain the cornerstone of insect management in potatoes. The high yield, low cost of potatoes and the relatively stringent quality standards required of fresh and processed potatoes gives growers relatively little flexibility or tolerance in insect control. Ultimately, growers need and expect near-perfect control of insect pests and this necessitates a relatively insecticide-focused control program.

Fortunately, the potato industry is sufficiently large to attract the attention of companies willing to develop new products. Currently, the industry is enjoying the introduction of several new insecticidal products including spirotetramat (Movento, Bayer CropSciences, functionally 2012), sulfoxaflor (Transform, Dow AgroSciences, 2013), cyazapyr (DuPont, 2014), Sivanto (flupyradifuron, Bayer CropSciences, 2014) and tolfenpyrad (Torac, Nichino 2015). Efficacy against potato insect pests has been worked out for all of these products based on ground applications. However, little or no data exists for most products when applied by air or chemigation.

There is a surprising lack of information on efficacy when applied by chemigation for most of the above products and similar information exists for several with existing registrations such as pyriproxyfen (Knack, Valent), novaluron (Rimon, Chemtura) and flonicamid (Beleaf, FMC). Following is an excerpt from the 2012 Integrated Pest Management Guidelines for Insects and Mites in Idaho, Oregon and Washington Potatoes “*Movento (spirotetramat, Group 23). Movento may be applied by air, ground or chemigation for control of psyllids. The manufacturer of Movento recommends air or ground application of the product when treating for psyllids.*” The reason that neither the registrant or the authors of the guidelines recommend use of Movento applied by chemigation, the most widely used insecticide on Washington potatoes in 2012, is that there are no efficacy data on its use by chemigation. Similar statements can be made for most, but not all, other aforementioned insecticides for most potato insect pests. While it may be tempting to conclude that this kind of development work should be paid for by the registrants, the fact remains that most do not fund such work.

Generating data by air or chemigation for insect pests is technically challenging, usually requires large plots, is expensive and if the product is not registered results in huge crop destruct costs. Additionally, depending on how the product is applied via chemigation, the irrigation system can have a large impact on efficacy.

In 2013, the products were applied by ground, by air and via chemigation. The ground applications were made by C02 back pack sprayer at the low and high labeled rate.. The aerial applications were made by helicopter. The chemigation was made by a ground pulled chemigation rig that has commercial style irrigation nozzles. Products were applied at the low and high labeled rate at 0.15 acre inches of water and at the high labeled rate in 0.25 acre inches of water. The aerial application was applied at the high labeled rate. The five new active ingredients were compared to industry standards of pymetrozine (Fulfill, Syngenta), thiamethoxam (Actara, Syngenta) and flonicamid (Beleaf, FMC).

Evaluation of Aerially Insecticides on Green Peach Aphids on Potatoes 2013							
Trt No.	Treatment Name	Rate	Unit	Appl Code	Aphids		Aphids
					Wingless Total	Winged Total	All Life Stages Total
9	PYMETROZINE	5.5	fl oz/a	BC	0.5 a	0.0 a	0.5 a
6	TOLFENPYRAD	21	fl oz/a	BC	0.8 a	0.0 a	0.8 a
2	MOVENTO	5	fl oz/a	AB	0.8 a	0.3 a	1.0 a
5	FLUPYRADIFURN	10.5	fl oz/a	BC	1.0 a	0.0 a	1.0 a
8	FLONICAMID	2.8	oz/a	BC	2.0 a	0.0 a	2.0 a
4	SULFOXAFLOL	1.5	fl oz/a	BC	1.5 a	0.8 a	2.3 a
3	CYZAPYR	20.5	fl oz/a	BC	2.0 a	0.5 a	2.5 a
7	THIAMETHOXAN	3	oz/a	BC	2.5 a	0.0 a	2.5 a
1	UTC				2.0 a	0.5 a	2.5 a

Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)

Evaluation of Chemigated Insecticides of Green Peach Aphids on Potatoes 2013

Trt No.	Treatment Name	Rate	Rate Unit	Spray Volume	Volume Unit	Appl Code	Aphid Wingless Total	Aphid Winged Total	All Life Stages Total
1	UTC						5 a	1.3 a	6.3 a
2	MOVENTO	5.0	fl oz/a	0.15	acre/inch	AB	5.8 a	0 b	5.8 a
3	MOVENTO	5.0	fl oz/a	0.25	acre/inch	AB	4.8 a	0.3 b	5 a
4	CYAZYPYR	13.5	fl oz/a	0.15	acre/inch	B	2.8 a	0 b	2.8 a
5	CYAZYPYR	20.5	fl oz/a	0.15	acre/inch	B	3 a	0 b	3 a
6	CYAZYPYR	20.5	fl oz/a	0.25	acre/inch	B	3.5 a	0.3 b	3.8 a
7	SULFOXAFLO	0.8	oz/a	0.15	acre/inch	B	4.8 a	0 b	4.8 a
8	SULFOXAFLO	1.5	oz/a	0.15	acre/inch	B	0.8 a	0.3 b	1 a
9	SULFOXAFLO	1.5	oz/a	0.25	acre/inch	B	1.3 a	0 b	1.3 a
10	FLUPYRADIFURONE	8.7	fl oz/a	0.15	acre/inch	B	3.5 a	0 b	3.5 a
11	FLUPYRADIFURONE	10.5	fl oz/a	0.15	acre/inch	B	3.5 a	0 b	3.5 a
12	FLUPYRADIFURONE	10.5	fl oz/a	0.25	acre/inch	B	5 a	0 b	5 a
13	TOLFENPYRAD	14.0	fl oz/a	0.15	acre/inch	B	3.3 a	0 b	3.3 a
14	TOLFENPYRAD	21.0	fl oz/a	0.15	acre/inch	B	2.5 a	0 b	2.5 a
15	TOLFENPYRAD	21.0	fl oz/a	0.25	acre/inch	B	5 a	0 b	5 a
16	PYMETROZINE	5.5	oz/a	0.15	acre/inch	B	4 a	0 b	4 a
17	THIAMETHOXAM	3.0	oz/a	0.15	acre/inch	B	3.8 a	0 b	3.8 a
18	THIAMETHOXAM	3.0	oz/a	0.25	acre/inch	B	5 a	0 b	5 a
19	FLONICAMID	2.0	oz/a	0.15	acre/inch	B	3.8 a	0.3 b	4 a
20	FLONICAMID	2.8	oz/a	0.15	acre/inch	B	2 a	0 b	2 a
21	FLONICAMID	2.8	oz/a	0.25	acre/inch	B	4.3 a	0 b	4.3 a

Evaluation of Foliar Insecticides of Green Peach Aphids on Potatoes 2013							
Trt No.	Treatment Name	Rate	Rate Unit	Appl Code	Aphid Wingless Total	Aphid Winged Total	All Life Stages Total
1	UTC				5.8 a	0.5	6.3 a
2	MOVENTO DYNE-AMIC	5.00 0.25	fl oz/a % v/v	AB AB	2.5 a	0 b	2.5 a
3	CYAZYPYR DYNE-AMIC	13.50 0.25	fl oz/a % v/v	B B	2.8 a	0 b	2.8 a
4	CYAZYPYR DYNE-AMIC	20.50 0.25	fl oz/a % v/v	B B	1.8 a	0 b	1.8 a
5	SULFOXAFLO DYNE-AMIC	1.43 0.25	fl oz/a % v/v	B B	1.8 a	0 b	1.8 a
6	SULFOXAFLO DYNE-AMIC	2.14 0.25	fl oz/a % v/v	B B	3.5 a	0 b	3.5 a
7	FLUPYRADIFURONE DYNE-AMIC	8.70 0.25	fl oz/a % v/v	B B	2.3 a	0 b	2.3 a
8	FLUPYRADIFURONE DYNE-AMIC	10.50 0.25	fl oz/a % v/v	B B	1.8 a	0 b	1.8 a
9	TOLFENPYRAD DYNE-AMIC	14.00 0.25	fl oz/a % v/v	B B	3.3 a	0 b	3.3 a
10	TOLFENPYRAD DYNE-AMIC	21.00 0.25	fl oz/a % v/v	B B	1.5 a	0 b	1.5 a
11	PYMETROZINE DYNE-AMIC	5.50 0.25	oz/a % v/v	B B	3 a	0 b	3 a
12	THIAMETHOXAM DYNE-AMIC	3.00 0.25	oz/a % v/v	B B	3.5 a	0 b	3.5 a
13	FLONICAMID DYNE-AMIC	2.00 0.25	oz/a % v/v	B B	3.8 a	0 b	3.8 a
14	FLONICAMID DYNE-AMIC	2.80 0.25	oz/a % v/v	B B	3.3 a	0 b	3.3 a