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Use and Costs of Insecticides to Control Zebra Chip and Psyllids

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Introduction

This is a progress report based on research conducted in a USDA-funded project on zebra chip (ZC). The project's primary goal is to develop a comprehensive, environmentally responsible ZC disease management program. This report is based on data collected from growers in Texas, Kansas and Nebraska for their 2009, 2010, and 2011 potato crops. As a step toward profitable control of ZC we analyzed control practices among growers in these three states. Our specific objectives were to: (1) determine grower use of insecticides to control ZC and (2) estimate costs of insecticide materials and applications.

Methods

To estimate ZC control costs we needed the following data: (1) insecticides growers applied, (2) number of applications, (3) application rates, (4) insecticide prices, (5) insecticide application costs. For items (1) and (2) we relied on data provided by cooperating growers in the project for 53 fields in Texas, Kansas, and Nebraska. We analyzed insecticide labels for information on recommended application rates and used the highest label rate for individual applications. When total application limits were relevant, we reduced subsequent application rates to comply with maximum allowances. We obtained insecticide prices and pesticide application costs from the following sources: (1) University of Idaho (Patterson & Painter 2010, Patterson & Painter 2011), (2) North Dakota State University (2010) and (3) phone calls to agricultural chemical dealers.

Results

Cooperating growers in Texas used 18 different insecticides for the 2009-2011 crops (Table 1). The number of materials used decreased from 16 products in 2009 and 2010 to 10 in 2011. The two most widely used materials in 2011 were Movento and Admire. Movento was used in 100% of the fields in 2011, moving up from 70% in 2009 to 92% in 2010. Admire use followed a similar upward trend. One chemical that declined in use was Agri-Mek, but the generic form of the product, Epi-Mek increased.

Cooperating growers in Kansas and Nebraska used 21 different insecticides for the 2009-2011 crops (Table 2). Most of the materials used in Kansas and Nebraska are the same as those used in Texas. Movento was the most frequently used insecticide in all three years. Trends are less clear for

Kansas and Nebraska because of variation in the number of fields from 3 in 2009 to 12 in 2010 and 4 in 2011, but the number of insecticides used dropped from 20 in 2010 to 10 in 2011.

Insecticide material and application costs exceeded $100 per acre in all but one of the 53 fields in the three year period (Table 3). The highest cost was $499 per acre at McAllen, Texas in 2010. The average cost in all Texas locations for all three years was $292 per acre. The average for Kansas and Nebraska was lower at $243, but the costs in 2010 and 2011 were near the Texas averages for those years.

The 2009-2011 trend for average insecticide costs is flat for Texas and upward for Kansas & Nebraska (Figure 1). For some locations costs varied over a wide range in the same year. For example, 2010 costs in six fields at McAllen, Texas ranged from $176 to $499 per acre. Costs for the three fields at Pearsall, Texas varied from $154 to $401 per acre in 2011. Although average costs per acre seem to have stabilized, the costs in some fields continue to be well above averages.

Cooperating potato growers dealt with a new pest about which little was known. Only three insecticides were labeled for potato psyllids when they planted the 2009 crop. In addition to the three labeled products, growers applied insecticides labeled for other potato pests, hoping they might also suppress psyllids. Meanwhile, pesticide firms obtained potato psyllid labels for twelve insecticides during the 2009-2011 period. As time passed, growers narrowed the total number of different insecticides they applied.

Additional grower-level costs include yield and quality losses. We conducted a survey of experts who attended the 2011 Zebra Chip meeting in San Antonio to help estimate yield losses. We asked the respondents to estimate the percent yield loss due to ZC/psyllids, assuming the following:

- growers use best management practices
- typical growing season
- average for all varieties
- locations where ZC/psyllids are currently a problem

Twenty scientists, growers and other industry experts completed the survey. Estimates for yield loss ranged from 0.5% to 75%. The average was 18%. Comments included:

“We have had success recently. It appears to be due to a change in chemical use which allows for survival of beneficials (soft chemistries).”

“The impact on quality is equally important.”

“Averages are misleading because variety is a big factor.”

“Psyllids are a sporadic pest.”

References

North Dakota State University. 2010. Insecticide price list. Retrieved from: http://www.ag.ndsu.nodak.edu/aginfo/entomology/entupdates/ICG_09/25_price_list09.pdf

Patterson, P. and K. Painter. 2011. Idaho custom rates for Idaho agricultural operations 2010-2011. Extension Bulletin 729. University of Idaho.

Patterson, P. and K. Painter. 2010. Idaho crop input price summary. Agricultural Economics Extension Series No 10-02. University of Idaho.

Table 1. Insecticide use to control ZC and psyllids, Texas, 2009-11

Insecticide		Fields treated (%)		
Common/trade name	Active ingredient	2009	2010	2011
Admire Pro	Imidacloprid	40%	75%	92%
Agri-Mek	Abamectin	40%	67%	25%
Asana	Esfenvalerate	30%	17%	
Baythroid	B-Cyfluthrin	10%	8%	
Belay	Clothianidin		8%	
Beleaf	Flonicamid	20%	17%	25%
Epi-Mek	Abamectin	30%	33%	58%
Fulfill	Pymetrozine	70%	42%	50%
Leverage 360	Imidacloprid + beta-cyhalothrin	10%	8%	
Movento	Spirotetramat	70%	92%	100%
Oberon 2 SC	Spiromesifen	40%	58%	42%
Platinum	Thiamethoxam	30%	8%	
Radiant SC	Spinetoram	10%		
Thimet	Phorate	10%		8%
Thiodan	Endosulfan	10%	8%	8%
Venom (foliar)	Dinotefuran	30%	8%	17%
Venom(soil)	Dinotefuran	10%	8%	
Vydate C	Oxamyl		8%	
Number of fields in sample		10	12	12
Total number of insecticides used		16	16	10
Average number of insecticides used per field *		5.3	5.0	5.3
Average number of insecticide applications *		8.7	7.9	7.9
** Differences are not statistically significant*				

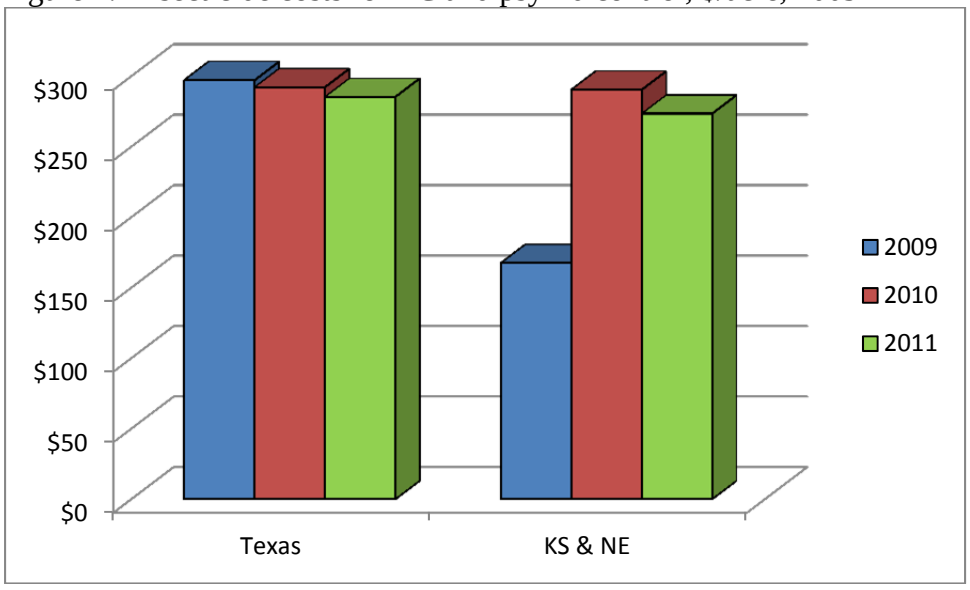
Table 2. Insecticide use to control ZC and psyllids, Kansas and Nebraska, 2009-11

Insecticide		Fields treated (%)		
Common/trade name	Active ingredient	2009	2010	2011
Abacus	Abamectin		8%	
Admire Pro	Imidacloprid	100%	58%	50%
Agri-Mek	Abamectin		42%	25%
Asana	Esfenvalerate	100%	25%	25%
Baythroid	B-Cyfluthrin	33%	75%	
Beleaf	Flonicamid			25%
Dimate	Dimethoate		25%	
Endigo	Lambda-cyhalothrin + Thiamethoxam		25%	
Endosulfan	Endosulfan		8%	
Epi-Mek	Abamectin		25%	
Fulfill	Pymetrozine		33%	25%
Leverage 360	Imidacloprid		8%	25%
Movento	Spirotetramat	100%	75%	75%
Oberon 2 SC	Spiromesifen		33%	25%
Platinum	Thiamethoxam		42%	
Pounce	Permethrin		25%	25%
Regent	Fipronil		17%	
Scorpion	Dinotefuran		33%	
Thimet	Phorate	100%	25%	
Thiodan	Endosulfan		17%	25%
Vydate C	Oxamyl		8%	
Number of fields in sample		3	12	4
Total number of insecticides used		5	20	10
Average number of insecticides used per field		4.3	6.3*	4.0
Average number of insecticide applications		7.7	9.5*	6.0
** Statistically significant*				

Table 3. Insecticide costs for ZC and psyllid control, 2009-11

Year/Locations	Fields	Low ($/acre)	High ($/acre)	Average ($/acre)
2009				
Kansas, Garden City	3	$214	$241	$167
Texas, Dalhart	2	$286	$292	$289
Texas, McAllen	4	$296	$344	$319
Texas, Olton	1	$223	$223	$223
Texas, Pearsall	3	$214	$452	$358
2010				
Kansas, Garden City	3	$303	$399	$367
Nebraska, Alliance	3	$111	$168	$367
Nebraska, Imperial	3	$290	$356	$275
Nebraska, Minden	3	$131	$191	$153
Texas, Dalhart	2	$323	$388	$355
Texas, McAllen	6	$176	$499	$362
Texas, Olton	1	$270	$270	$270
Texas, Pearsall	3	$151	$226	$180
2011				
Kansas, Garden City	1	$443	$443	$443
Nebraska, Bridgeport	1	$231	$231	$231
Nebraska, Angora	1	$146	$146	$146
Nebraska, Minden	1	$31	$31	NA
Texas, Dalhart	3	$252	$358	$304
Texas, McAllen	4	$229	$338	$274
Texas, Olton	2	$240	$330	$285
Texas, Pearsall	3	$154	$401	$279

Figure 1. Insecticide costs for ZC and psyllid control, $/acre, 2009-11



Resources & Hotlines for the Northwest Potato Industry
(Just a sample of available resources)

Insects/Diseases

Potato Insect Pest Survey for the Columbia Basin of Washington
http://potatoes.wsu.edu/survey/PotatoInsectSurvey.html
Insect survey information, plus an opportunity to sign up for e-mail alerts.

Pacific Northwest and Treasure Valley Pest Alert Network
http://www.tvpestalert.net/
A website for pest information on many crops, plus an opportunity to sign up for e-mail alerts.

Late blight hotlines:
Washington: 800-984-7400
Oregon: 800-705-3377
Idaho: 800-791-7195
Information on late blight finds in the region, plus suggested management strategies.

Northwest Potato Research (from the Potato Commissions)
http://www.nwpotatoresearch.com/
Here are mapped displays of insect catch information for the Columbia Basin and Idaho, plus much general information about pests, diseases, and beneficial organisms.

Oregon State University
Hermiston: http://oregonstate.edu/dept/hermiston/
Ontario: http://www.cropinfo.net/
Klamath Falls: http://oregonstate.edu/dept/kbrec/
With links to local pest reports, management recommendations, and more.

Varieties/General

Potatoes at WSU
http://potatoes.wsu.edu/
Presenting much data and information on new varieties, management practices, seed lot trials, plus access to other research and extension programs at WSU.

Idaho Center for Potato Research
http://www.cals.uidaho.edu/potatoes/
A portal to faculty and research/extension serving the potato industry in Idaho.

Oregon Potato Information Exchange
http://oregonstate.edu/potatoes/
An access point to potato information from Oregon, the PNW, and around North America.

Northwest Potato Research
http://www.nwpotatoresearch.com/
The site includes a database of all past proceedings from the Washington potato conference, all issues of Potato Progress, and much more.