Potato Progress

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Management of BLTVA in Potatoes

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A serious epidemic of a "potato yellows" disease occurred in many potato fields throughout the Columbia Basin in 2002. The beet leafhopper-transmitted virescence agent (BLTVA), a bacteria-like organism called a phytoplasma, has been shown to be a primary, if not the only, cause of this disease. The known vector for this disease is the beet leafhopper (BLH), but we must note that phytoplasmas are generally not vector-specific. Testing is underway to determine if other leafhoppers in the region can transmit BLTVA, but for now other species must be considered potential vectors. Despite limited knowledge about this disease and its vector(s), potato growers need to consider protecting their crops from this pest. The following summarizes our professional opinions regarding BLTVA management in potatoes. Andrew Jensen's contribution to this article is limited to the biology of the insect and disease pests.

We are aware of no data on control of BLTVA-transmitting leafhoppers in potatoes. We must rely on information on control of other species of leafhoppers, notably the potato leafhopper, in potatoes in the Midwest, what we know about controlling leafhoppers in other crops, and what we know generally about insecticides labeled for use on potatoes. Prophylactic use of insecticides is the only known means to prevent transmission of BLTVA. The Washington vegetable seed industry has been plagued with BLTVA for years and even the prophylactic use of insecticides has not always successfully managed it. Some vegetable seed crops are no longer grown in the Columbia basin due to inadequate control of BLTVA.

Monitoring and Action Thresholds. Potatoes are not a preferred host of the likely vectors of BLTVA (including beet leafhopper), making in-field sampling difficult. We suggest monitoring for leafhoppers using yellow sticky cards around field margins. Historically, initial BLH flights occur in late May and June in the Columbia Basin. However, because of our incomplete knowledge of BLTVA vectors, we suggest following populations of other leafhoppers as well. Control measures should start when leafhopper flights begin and fields must be protected for the duration of these flights. Beet leafhopper flights usually last two to four weeks, but longer flights are known to occur. Other species of leafhoppers may follow a different pattern. Until we collect more data on this problem, detection of BLH at any level in or near a field, or even knowledge of BLH flights in your general area, should indicate a possible action threshold for treatment. Large or increasing numbers of other leafhopper species would also be a prudent action threshold at this time. We plan on posting relevant leafhopper sampling results and other information on the potato/aphid web site hosted by Keith Pike (http://www.potato.prosser.wsu.edu).

Consider your overall insect program. Before selecting an insecticide for controlling leafhoppers, think about the impact of your selection on the rest of your program. Some insecticides have seasonal limits. Use of a product for leafhoppers early in the season may restrict usage later in the season. For example, there is a 3.0 oz/season limitation on Actara, and if 1.5 oz of Actara is applied for leafhoppers, you cannot use the product at 3.0 oz for aphids. Pyrethroids such as Asana, Baythroid, Ambush, Pounce, and Leverage are tempting options for control of leafhoppers due to high efficacy, low price, and broad spectrum. Broad spectrum products such as pyrethroids also remove beneficial insects that help control pests such as aphids and mites. One to three applications of a pyrethroid can result in aphid and mite outbreaks. Asana, Baythroid, Ambush, Pounce, and Leverage have a role in potato insect management, but careful consideration should be given to their use.

Residual Control. BLTVA is transmitted by a vector(s) that is(are) difficult to detect, complicating disease management. Timing applications based on counts of leafhoppers in a field is risky. Success in preventing transmission of BLTVA is most likely through the use of longer residual insecticides at the beginning of leafhopper flights and maintaining insecticide residues on potato foliage sufficient to kill leafhoppers. Restricting BLTVA transmission is most likely using insecticides having residual activity of 10 to 14 days. Depending on duration of leafhopper flights and application timing, 2 applications providing 20 to 28 days of control may be sufficient. If plants are actively growing during this time, contact insecticides, such as pyrethroids, will not provide control on foliage produced after application. For actively growing plants, apply a systemic insecticide or reduce the application intervals for contact insecticides. Because leafhoppers in other cropping systems are considered easy to control, it is tempting to use below labeled rates of insecticides; a not uncommon practice in the Mid-West for non-disease transmitting leafhoppers. Reducing the rate of any insecticide will reduce the period of residual activity; do not use below labeled rates of insecticides for control of these leafhoppers.

Efficacy & Method of Application. No insecticide screening against leafhoppers in potatoes has been done in the PNW; however, related work has been done in other crops and in other regions on other leafhoppers on potatoes. Based on such work, leafhoppers are considered to be relatively easy to control. Most insecticides listed in Table 1 will kill leafhoppers, but other considerations significantly reduce the utility of several of them. Chemigation may result in reduced insecticide residues on the foliage. Due to poor knowledge of effect of application method on efficacy, do not apply insecticides for leafhopper in potatoes via chemigation unless you are confident the application will result in adequate insecticide residues on the foliage. Adequate coverage, particularly with contact insecticides, is critical.

Planting Time Insecticides. Temik, Admire, Gaucho, Genesis, Thimet/Phorate, Platinum, and Vydate applied at planting time, all have leafhopper on the label, although none specify BLH. Based on 2002 experience with BLTVA infested fields, at-plant treatments did not appear to provide protection against the disease. This observation has at least two possible explanations. One explanation is that BLTVA-transmitting leafhoppers probe and feed only briefly on potato and transmit the disease during this activity, and transmission may occur before the insect is killed by the systemic insecticide. A second explanation is that by the time leafhoppers infest potatoes, the remaining insecticide cannot control the vector leafhopper. While some at-plant insecticides may provide some benefit, growers should depend primarily on foliar insecticides rather than at-plant treatments to control these leafhoppers.

Foliar Products with Limited or No Utility for Control of Leafhopper.
M-Pede - A product with low efficacy; the label suggests combining with other insecticides.

Lannate, dimethoate, methyl parathion, malathion, and Di-Syston - These products will kill leafhopper

but have relatively short periods of residual control. Other options exist that have similar efficacy but provide a longer period of control.

Guthion and Sevin - Neither product is used for leafhopper control in other crops or for potato leafhopper in the Mid-West. Other products with known efficacy for leafhoppers are better choices.

Foliar Products with Uncertain Utility for Control of Leafhoppers.
Furadan, Thiodan/Endosulfan/Phaser and Imidan - Due to lack of research, we know little about the relative efficacy and period of residual activity of these products against leafhoppers.

Foliar Products with a Higher Potential for Leafhopper Control.
Asana, Baythroid, Ambush, and Pounce - These products are highly effective against leafhoppers and can provide a long period of residual control. These products will also control several other insect pests. Use of these products is discouraged in most potato pest management scenarios due to their potential to cause aphid and mite outbreaks. In some situations, these products may be appropriate for control of BLTVA-transmitting leafhoppers in potatoes.

Provado and Actara - Both products have excellent efficacy against leafhoppers and have relatively long periods of residual activity. Due to resistance management concerns neither product should be used if a neonicitinoid insecticide such as Admire, Gaucho, Genesis, or Platinum, has been used at planting time. An infrequent application of either product against leafhoppers following a planting time treatment of neonicitinoid insecticide is not prohibited by the label and in some situations may be the best option available. Do not apply the 1.5 ounce rate of Actara more than twice. Do not apply Provado more than four times at the 3.75 oz rate.

Leverage - This is a mix of imidacloprid (Provado) and cyfluthrin (Baythroid). Because it contains a pyrethroid, it is viewed similar to other pyrethroids. With its neonicitinoid, imidacloprid, Leverage controls a broader spectrum of pests than a pyrethroid alone. It is subject to the same limitations as Provado.

Monitor - Monitor provides excellent efficacy against leafhopper and has a relatively long period of residual activity. There is a seasonal limitation on the amount that can be used - do not treat more than 4 times at the 2 pint rate or 5 times at the 1.5 pint rate.

Vydate - Several anecdotal observations from the 2002 growing season suggest that a program including 3 to 4 applications of Vydate in June and early July controlled transmission of BLTVA, while adjacent fields without a Vydate program were heavily impacted. Based on knowledge of how this product works and experiences from the 2002 growing season, Vydate can be an important tool for control of BLTVA. Carefully consider timing of the early applications of the product. Applications should begin before or at the very beginning of leafhopper flights.

Table 1. Insecticides registered for potatoes with leafhopper on the label.

Planting Time Treatments			
Brand Name	**Common Name**	**Rate**	
Temik	aldicarb	14 to 20 lb product/acre.	
Admire 2F	imidacloprid	in furrow at 0.9 to 1.3 fl oz product per 1,000 ft of row.	
Gaucho MZ	imidacloprid	seed piece treatment at 0.75 lb product per 100 lb cut seed pieces.	
Genesis	imidacloprid	seed piece treatment at 0.4 to 0.8 fl oz product per 100 lb seed pieces.	
Thimet 20G, Phorate 20G	phorate	2.3 to 3.5 lb ai/1,000 ft of row.	
Platinum	thiamethoxam	5 to 8 fl oz product/acre.	
Foliar Treatments			
Common Name	**Brand Name**	**Rate**	**Use Limitations**
azinphos-methyl	Guthion	0.5 to 0.75 lb ai/acre	
carbaryl	Sevin	0.5 to 2 lb ai/acre	
carbofuran	Furadan 4F	0.5 to 1 lb ai/acre	Do not apply by chemigation.
cyfluthrin	Baythroid 2	0.8 to 1.6 fl oz product/acre	
imidacloprid + cyfluthrin	Leverage 2.7	3 to 3.75 fl oz product/acre	Lower rate for ground. For chemigation and aerial application, use 3.75 fl oz/acre.
dimethoate		0.25 to 0.5 lb ai/acre	
endosulfan	Thiodan 3EC, Phaser 3EC, Endosulfan 3EC	0.5 to 1 lb ai/acre	
	Thiodan 50WP, Phaser 50 WSB, Endosulfan 50 WP	0.5 to 1 lb ai/acre	Do not apply through any type of irrigation system.
esfenvalerate	Asana XL	0.03 to 0.05 lb ai/acre	0.35 lb ai/acre limit.
imidacloprid + cyfluthrin	Leverage 2.7	3 to 3.75 fl oz product/acre	Lower rate for ground. For chemigation and areial application, use 3.75 fl oz/acre.
imidacloprid	Provado 1.6 F	3.75 fl oz product/acre	15 oz product per acre limit
malathion		0.625 to 3 lb ai/acre	
methamidophos	Monitor	0.75 to 1 lb ai/acre or 1.5 to 2 pt product/acre	4 lb ai/acre limit
methomyl	Lannate	0.45 to 0.9 lb ai/acre	
methyl parathion	Penncap-M, Declare	0.5 to 1 lb ai/acre	
oxamyl	Vydate L	2 to 4 pt product/acre	9 lb ai/acre limit
	Vydate C-LV	1 to 2.1 pt product/acre	
permethrin	Ambush, Pounce	0.05 to 0.2 lb ai/acre	1.6 lb ai acre limit
phosmet	Imidan 70-WSB	1.33 lb product/acre	
potassium salts of fatty acids	M-Pede	1 to 2% solution	
thiamethoxam	Actara	1.5 oz product/acre	3.0 oz product acre limit

Field Day Dates

Seed Lot Field Day, WSU Othello	June 27
Paterson USDA-ARS Field Day	July 16
Pest Management Field Day, Ag. Dev. Group, Eltopia	August 6