WASHINGTON STATE UNIVERSITY EXTENSION

Helping growers manage potato psyllids and zebra chip disease in the Columbia Basin of Washington State

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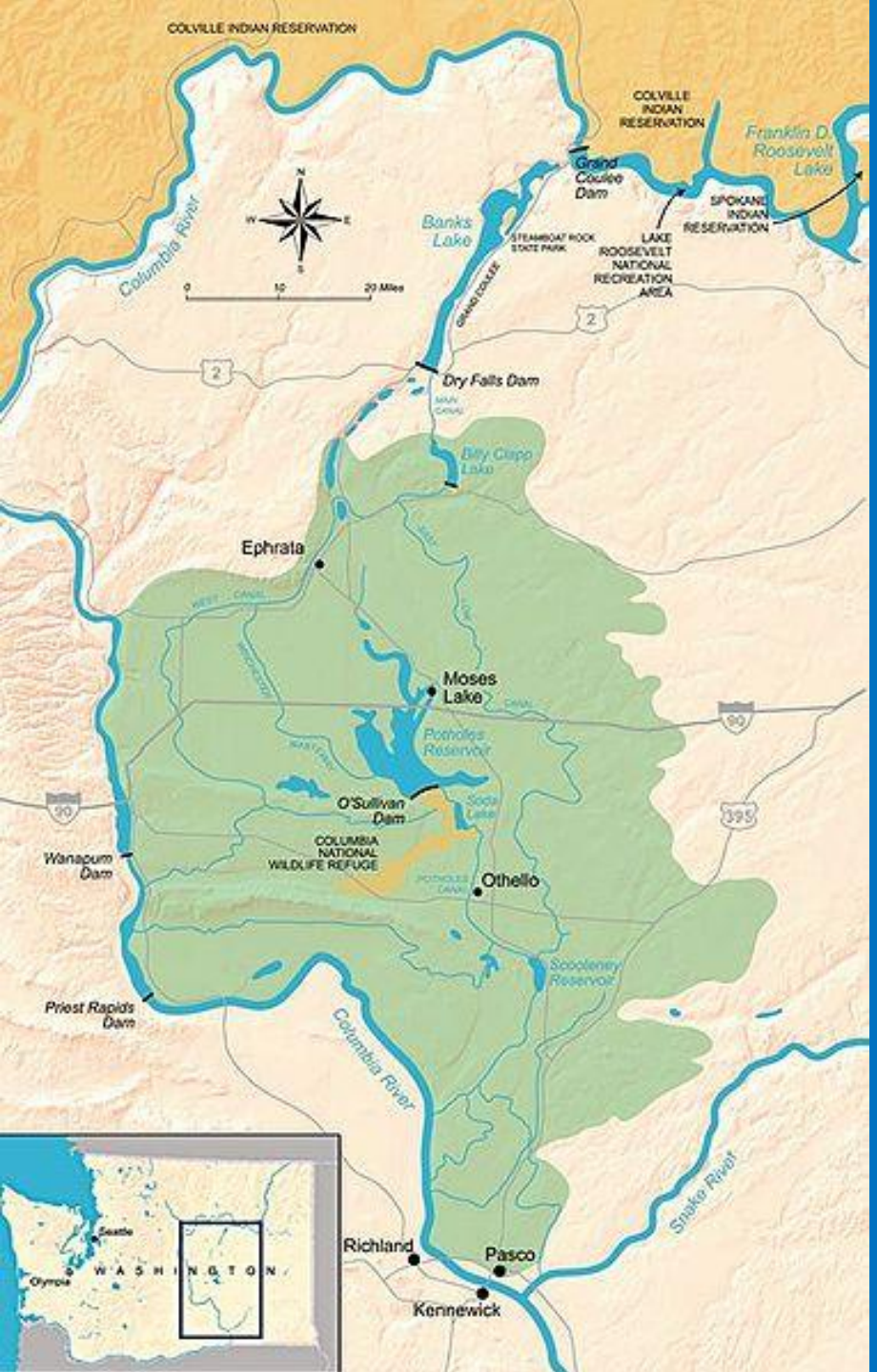
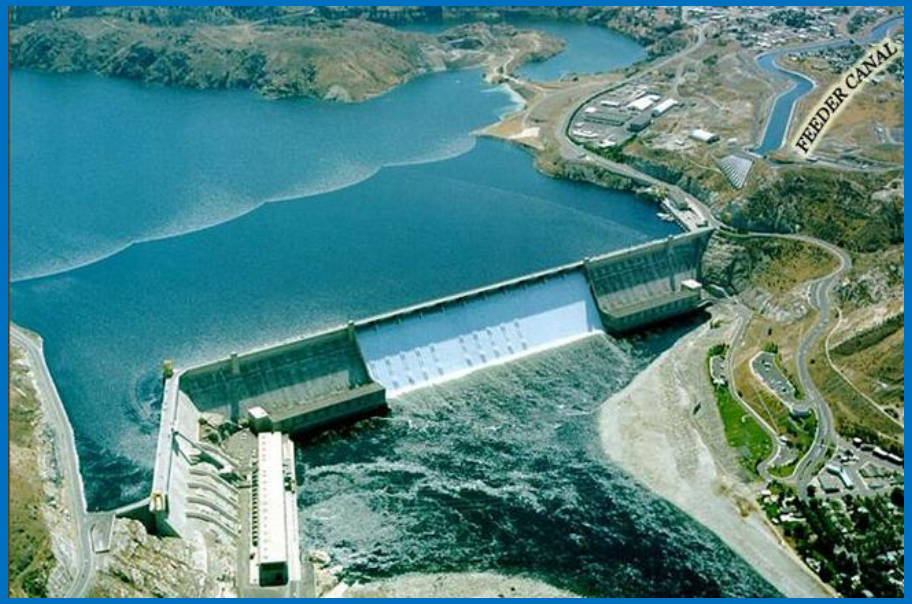
WASHINGTON STATE UNIVERSITY EXTENSION

2016 EAPR Pathology and Pests Meeting
Dundee, Scotland
August 10, 2016


CANADA
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
MAINE
VERMONT
NEW HAMPSHIRE
MASSACHUSETTS
RHODE ISLAND
CONNECTICUT
NEW JERSEY
DELAWARE
MARYLAND
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO
MEXICO
CUBA
THE BAHAMAS
HAWAII
ALASKA
Albers equal area projection
0 100 200 300 mi
0 100 200 300 km


Blaine
Bellingham
Mt Baker
10785
Oroville
Republic
Colville
Bonners Ferry
Strait of Juan de Fuca
Victoria
SAN JUAN ISLANDS
Anacortes
Skagit R
Cape Flattery
Cape Alava
Mount Vernon
5
Port Angeles
Lakewood
Glacier Peak
10541
Omak
Columbia R
Sandpoint
Franklin D Roosevelt Lake
Newport
Lake Pend Oreille
Forks
OLYMPIC
Mt Olympus
7969
Everett
Lynnwood
Lake Chelan
Grand Coulee
Chelan
Wilbur
Seattle
Redmond
Bremerton
Quinault R
Bellevue
CASCADE
WASHINGTON
Coulee City
Opportunity
Spokane
MTS
Renton
Tacoma
Federal Way
Wenatchee
Coeur d'Alene Lake
Ephrata
Hoquiam
Olympia
90
Puyallup
Yakima
WENATCHEE MTS
Moses Lake
Grays Harbor
Aberdeen
Lacey
Ellensburg
Potholes Res
Ritzville
Willapa Bay
Raymond
Centralia
Mt Rainier
14410
Colfax
South Bend
Chehalis
COLUMBIA BASIN
Pullman
Moscow
Yakima
Cape Disappointment
Cowlitz River
Snake
Toppenish
82
Richland
Pasco
Clarkston
Lewist
Astoria
Longview
Kelso
Mt St Helens
8363
Mt Adams
12276
Dayton
Kennewick
Seaside
Walla Walla
St Helens
Columbia R
Goldendale
Hermiston
Vancouver
84
Camas
OR
MTS
Tillamook
Hillsboro
Gresham
Pendleton
Cape Lookout
Beaverton
Portland
The Dalles
Mt Hood
Enterprise


COLVILLE INDIAN RESERVATION
COLVILLE INDIAN RESERVATION
Franklin D. Roosevelt Lake
Grand Coulee Dam
Columbia River
Banks Lake
STEAMBOAT ROCK STATE PARK
LAKE ROOSEVELT NATIONAL RECREATION AREA
SPOKANE INDIAN RESERVATION
GRAND COULEE
Dry Falls Dam
Billy Clapp Lake
Ephrata
Moses Lake
Potholes Reservoir
O'Sullivan Dam
Soda Lake
COLUMBIA NATIONAL WILDLIFE REFUGE
Wanapum Dam
Othello
Priest Rapids Dam
Scooteney Reservoir
Columbia River
Snake River
Richland
Pasco
Kennewick
Seattle
Olympia
WASHINGTON


FEEDER CANAL

Washington Potato Statistics

- 160,000 acres (67,000 ha) harvested with an average yield of 615 cwt/A (69,000 kg/ha).
- Value of production is $730,620,000.
- Washington produces 20% of the potatoes grown in the U.S.A.
- More than 85% of potatoes grown in WA are processed. WA leads the nation in frozen French fry production.

Zebra Chip Disease of Potato

- The causal agent of Zebra Chip (ZC) is a bacterium, *Candidatus* Liberibacter *solanacearum* (Lso).
- Transmitted to potatoes by the potato-tomato psyllid (*Bactericera cockerelli*).
- ZC reduces yields by causing premature plant senescence.
- ZC causes an internal tuber defect.
  - Discoloration of vascular ring and medullary ray tissues in tubers.
- First reported in Mexico in 1994.
- First reported in the U.S.A. (Texas) in 2000.
- First reported in the Pacific Northwest in 2011.

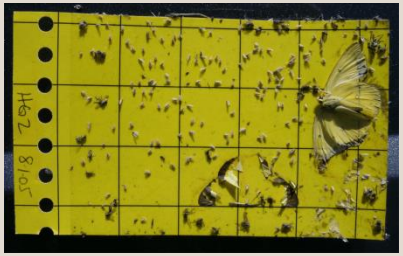

2011

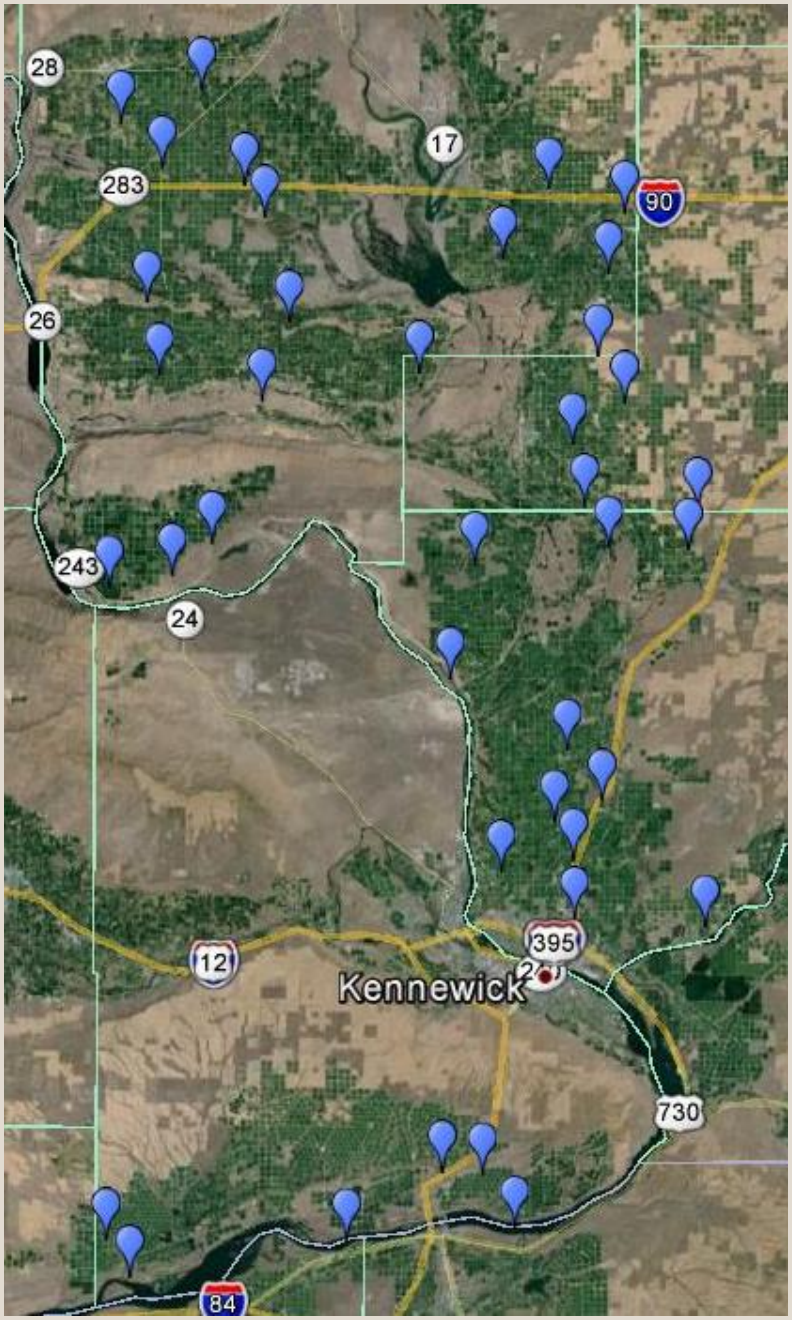
2011

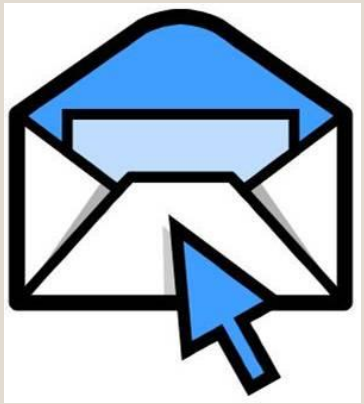
Photo courtesy of Charlie Rush, Texas AgriLife Research

Monitoring Network for Insect Pests of Potato in the Columbia Basin

- Targets four important insect pests…
  - Green peach aphid
  - Beet leafhopper
  - Potato tuberworm
  - Potato psyllid ← ADDED in 2012
- Provides current information about the size and location of insect pest populations, and can serve as an early warning system.
- Helps potato growers make informed insect pest management decisions.
- Contributes to a better understanding of the movement and biology of these insects in our region.




28
17
283
90
26
243
24
12
395
Kennewick
730
84



WASHINGTON STATE UNIVERSITY

WSU Potato Pest Alerts

Dear Potato Pest Alert Subscriber: This is the 20th potato pest alert issued for the 2015 growing season. If this message was forwarded to you and you would like to be added to the distribution list, send an email to cwohleb@wsu.edu. You can also send me an email if you want to be removed from the list, or if you have a comment about this week's report.

View this "Potato Pest Alert" in your browser by going to this web address #.

To ensure receipt of our emails, please add extirrigated.ag@wsu.edu to your Address Book and list of trusted senders.

INSECT MONITORING REPORTS

Report for September 18, 2015

TABLE OF CONTENTS

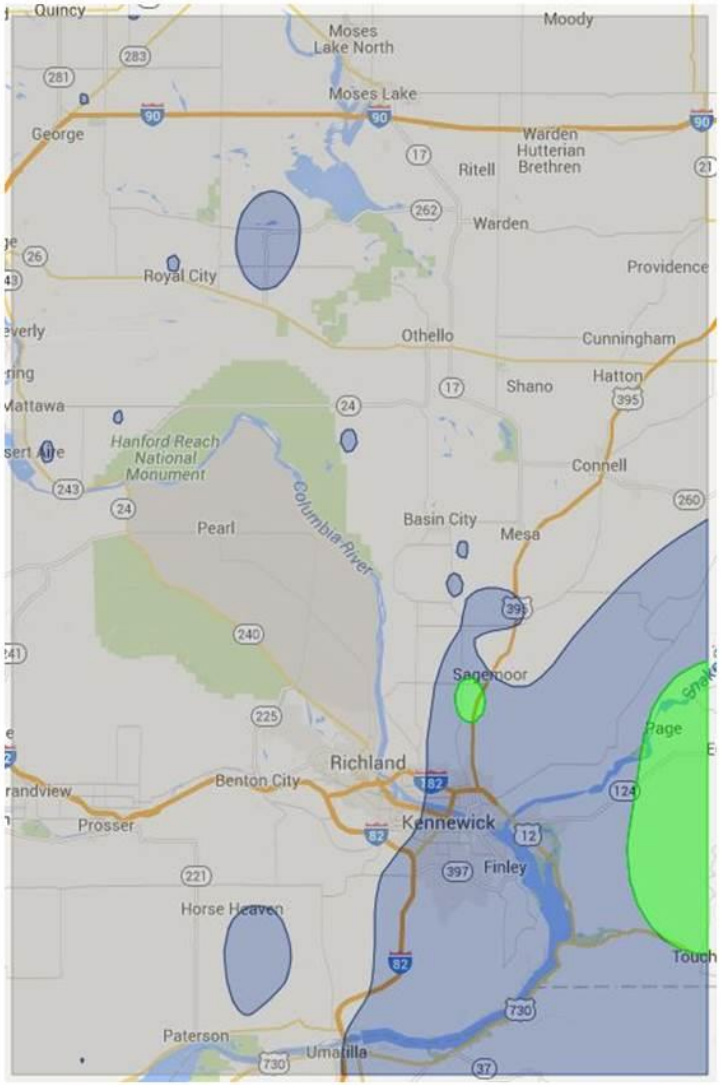
Click on the links below to fast-forward to each section.

POTATO PSYLLIDS: Potato psyllids were found on sticky cards in 89% of our insect sampling network fields this week (23 of 26 fields that still have traps up). The average catch rate was the highest yet this season at 7.5 psyllids per sticky card. This is more than 14 times greater than the average number of psyllids per card this time last year. A lot of psyllids are moving around right now, but that is not surprising since many potatoes are being vine killed or harvested now and psyllids are being displaced. **If your potato field has any vine left, then it is very likely that psyllids are moving in now.** Some of those psyllids could be carrying the bacterium (Lso) that causes zebra chip.

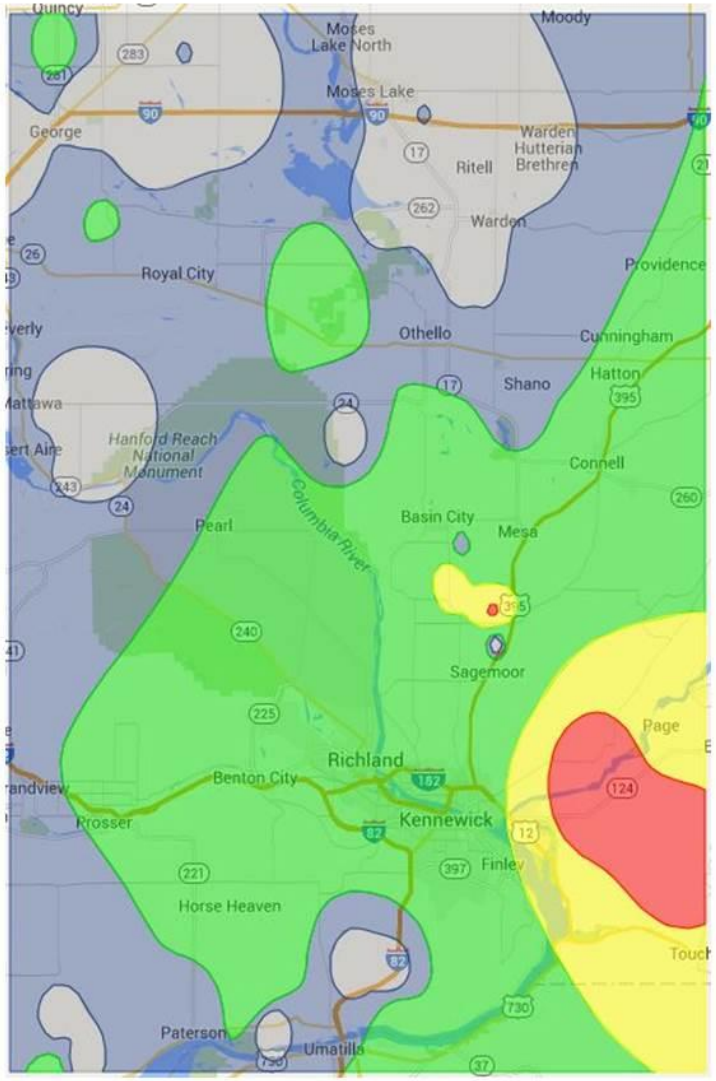
ZEBRA CHIP INCIDENCE: Early indications are that zebra chip incidence in Washington will be higher than it was last year. No major disasters have been reported to us, but zebra chip was confirmed in two fields in the Lower Columbia Basin in June and July, and a few more fields with some zebra chip were reported in August. Incidence within affected fields appears to be relatively low, but it is difficult to make that assessment now. We may know more about the overall incidence of zebra chip in the Basin after the crop has been processed. Infection rates of psyllids are very low (i.e. very few Lso+ psyllids have been collected), but psyllid populations are larger this year, which suggests an increased risk of zebra chip this

Potato Psyllid Pest Density Maps

Last Week: June 24, 2016

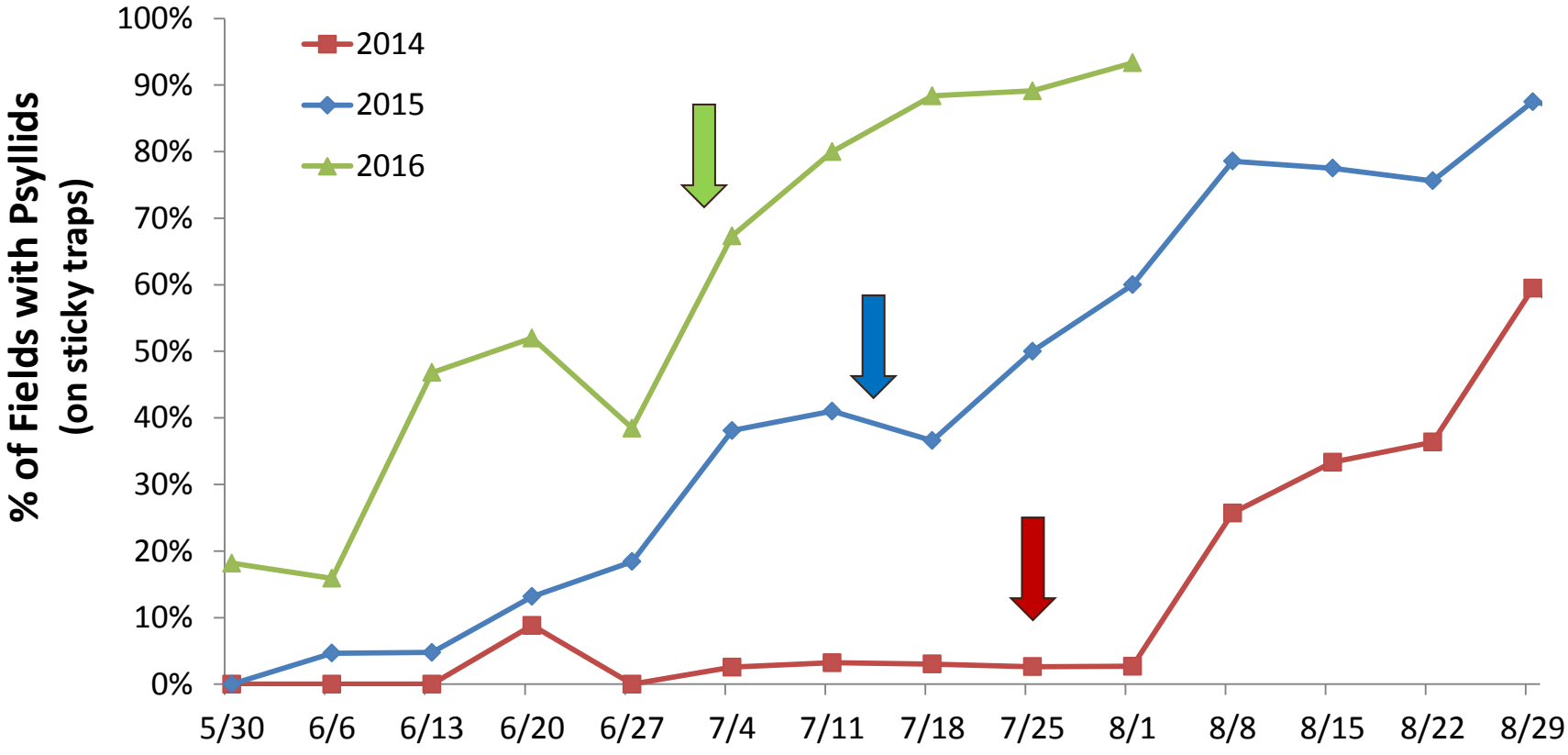


This Week: July 1, 2016

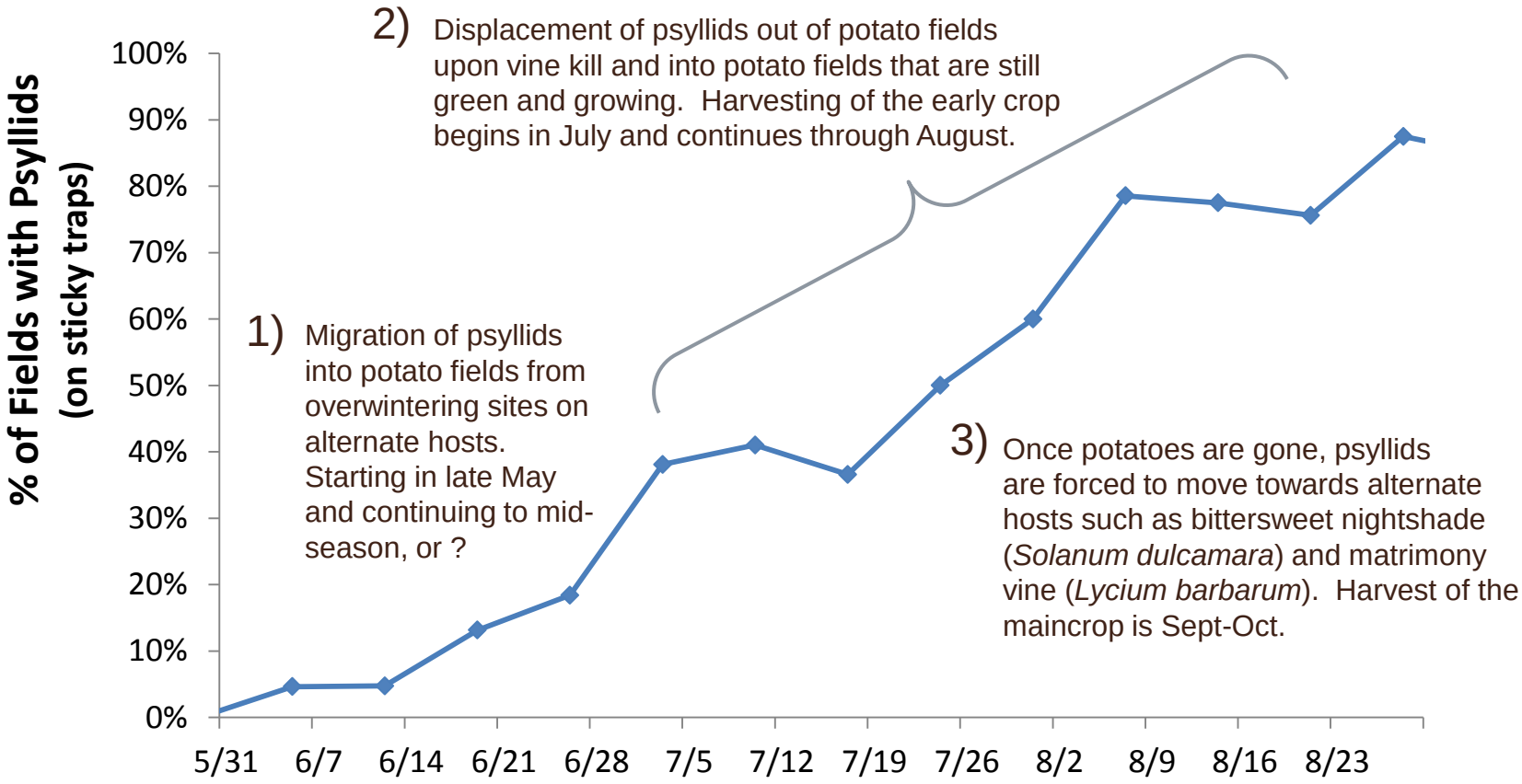


None | Low | Moderate | High | Very high

ADULT Potato Psyllid Migration Trends in the Columbia Basin of WA
Weekly Trapping Results: 2014-2016
POTATO PSYLLID MIGRATION & DISTRIBUTION

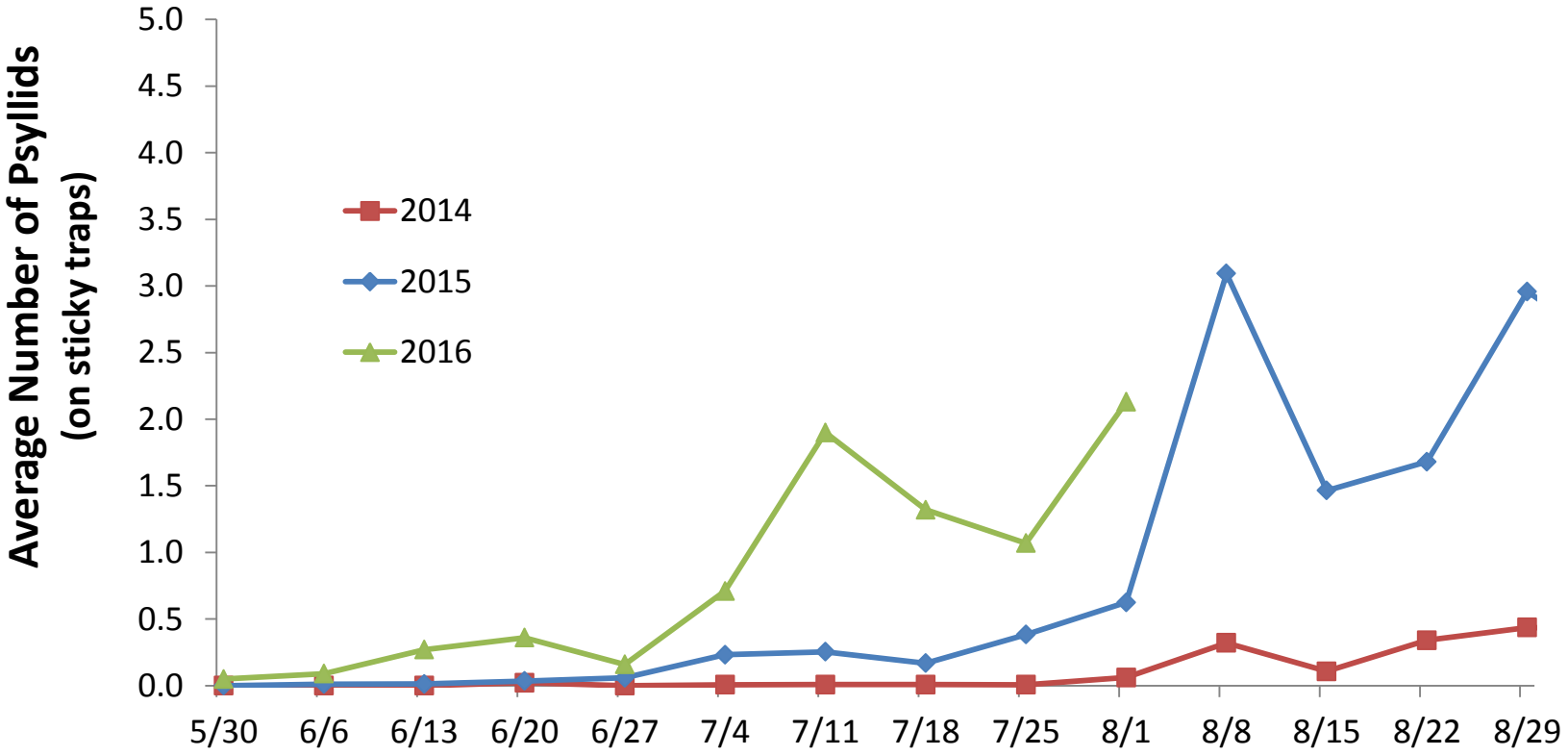


ADULT Potato Psyllid Migration Trends in the Columbia Basin
Weekly Trapping Results: 2015
POTATO PSYLLID MIGRATION & DISTRIBUTION

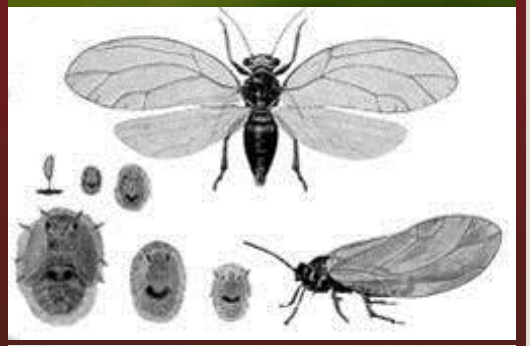


ADULT Potato Psyllid Migration Trends in the Columbia Basin of WA
Weekly Trapping Results: 2014-2016

POTATO PSYLLID DENSITY



Can We Predict Outbreaks of Zebra Chip?



- Psyllid numbers tend to be higher in the Lower Columbia Basin but some ZC has been found at low levels in fields throughout the Basin.
- Testing psyllids for Lso has not helped us predict where and when ZC will occur.
  - Incidence of Lso-infected psyllids has been very low (<1%). Higher rates of infection might be more predictive?
- Most growers in the Columbia Basin are managing psyllids with insecticides. This must contribute to the low incidence of ZC.

We recommend a risk-averse psyllid management program because ZC losses to any one grower can be significant and we can't predict where the outbreaks will occur.

Photos courtesy of Andy Jensen (top) and Carrie Wohleb (bottom)

Zebra Chip is a Manageable Disease

Insecticide Use Recommendations

- Use a neonicotinoid insecticide at planting or initiate a foliar insecticide program when you find psyllids migrating into your field.
- Neonics provide ~60 days of control.
- Look for nymphs and eggs. If you find them, then re-evaluate your earlier insecticide choices and apply a product that will control nymphs and eggs.
- Look for products that target the pests you have, but preserve beneficial insects.
- Don’t use pyrethroids between June 15th and two weeks before desiccation.
- Don’t use a foliar neonicotinoid, if you used one at planting (including package mixes).
- Don’t use any mode of action more than 2 times during the growing season.
- Use good surfactants and buffer spray solutions when recommended by the label.

SURVEY RESPONSES "Insecticide Applications" in 2015



- **On what % of fields did you apply a systemic insecticide at planting or at layby in 2015?**
  - **Early Potatoes** Average = 70.5%
    Range = 0% to 100%
  - **Late Potatoes** Average = 92.5%
    Range = 10% to 100%
- **On average, how many in-season foliar insecticide applications per field did you make?**
  - **Early Potatoes** Average = 3.8
    Range = 0 to 11
  - **Late Potatoes** Average = 6
    Range = 0 to 13

Colleagues and Other Contributors

- Dr. Tim Waters
- Dr. Dave Crowder and the Crowder Lab, especially Elizabeth D'Auria
- Drs. Erik Wenninger, Silvia Rondon, Stuart Reitz
- Dr. Joe Munyaneza and the Munyaneza Lab
- Drs. David Horton, Rodney Cooper, Jim Crosslin, Kylie Swisher and the USDA-ARS Wapato Team
- Dr. Bill Snyder and the Snyder Lab
- Dr. Andy Jensen
- Dr. Alan Schreiber
- Dr. Vince Jones and Stefano Borghi
- Washington State Potato Commission
- Cooperating Crop Consultants and Growers
- My Team: Sally Hubbs, John Wohleb, Camille Culbertson, Alice Turnbull and Carol Hernandez

Program Support

- **WA State Potato Commission** – sampling network funding.
- **USDA TASC Program** – expanded potato psyllid monitoring network 2014-2016.
- **USDA SCRI Program** – expanded potato psyllid monitoring in 2016-2018.
- **WSU CAHNRS Decision Support Systems Program** – led by Dave Crowder – will fund automation of pest density maps >> WSU Potato Decision Support System.
- **2016 WSDA Specialty Crop Block Grant** – Developing a DSS for potatoes – led by Vince Jones, developer of WSU Tree Fruit Decision-Aid System.
- **2016 USDA-ARS-State Partnership Program** – led by Dave Horton – test prototypes of 3D traps for psyllids.
- **2016 WSU CAHNRS Intern** – Camille Culbertson – she earns 2 credits and will demonstrate her work at the WSU Undergraduate Research Showcase.

Comments about “Potato Pest Alerts” from Subscribers

- “It consolidates a lot of regional information for convenient viewing.”
- “I rely on the pest alerts to aid me when scouting fields to be more aware of potential problems. They are a valuable resource.”
- “I believe it saves us a few applications per year knowing what is going on region wide.”
- “The main value is tracking the spread of pest problems, and also the recommendations.”
- “I like emails because I don’t need to look up a website or make a phone call.”
- “It’s an excellent tool for crop advisors and growers. I hope the program continues.”

Thanks

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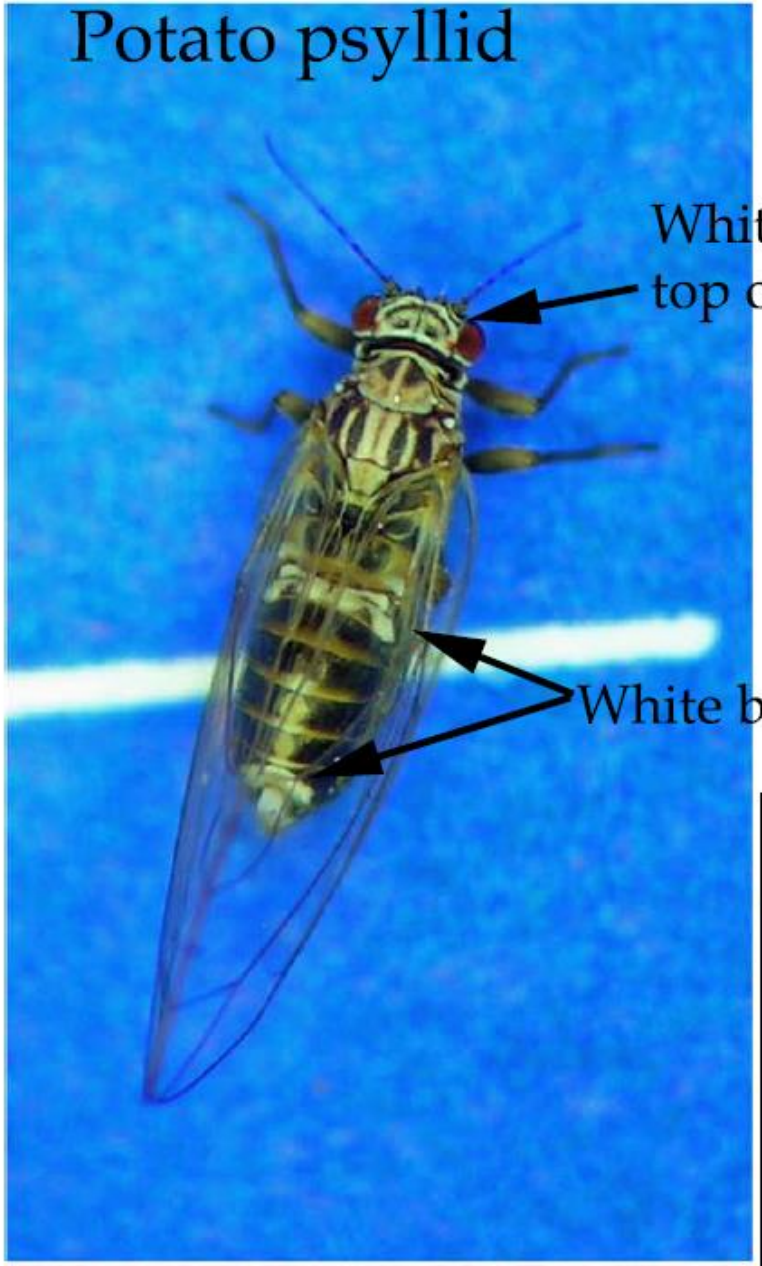
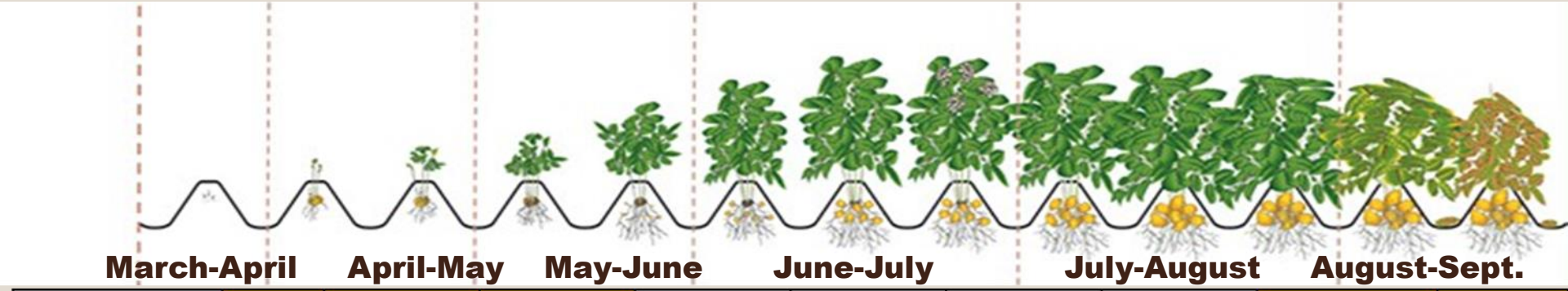


Other psyllids

Other psyllids

Colored wings



Wireworm									
CPB									
Aphid									
Leafhopper									
Psyllid									
Loopers									
Mites									
Thrips									
Lygus									
Tuberworm									

Trade Name[1] or Common Name	Active Ingredient	IRAC Group	Colorado Potato Beetle	Beet Leafhopper	Psyllid[2]	Aphids	Looper, Cutworm, Armyworm	Mites	Potato Tuberworm
Lannate	methomyl	1A		X	X	X	X		X
Vydate	oxamyl	1A	X	X		X			
Dimethoate	dimethoate	1B		X		X			
Imidan	phosmet	1B	X		X				X
Pyrethroids[3]	various	3	X	X	X		X		X
Assail	acetamiprid	4A	X	X	X	X			
Belay	clothianidin	4A	X	X	X	X			
Venom	dinotefuran	4A	X	X	X	X			
Admire	imidacloprid	4A	X	X	X	X			
Platinum	imidacloprid	4A	X	X	X	X			
Cruiser	thiamethoxam	4A	X	X	X	X			
Radiant	spinetoram	5	X		X (n)		X		
Agri-Mek	abamectin	6	X		X			X	
Fulfil	pymetrozine	9B			X	X			
Beleaf	flonicamid	9C			X	X			
Onager	hexythizox	10			X(e,n)			X	
Rimon	novaluron	15	X		X (e,n)		X		X
Torac	tolfenpyrad	21A	X	X	X	X			
Avaunt	indoxacarb	22	X				X		X
Blackhawk	spinosad	5	X		X (n)		X		
Movento	spirotetramat	23			X (e,n)	X			
Oberon	spiromesifen	23			X (e,n)			X	
Acramite	bifenazate	25						X	
Coragen	renaxypyr	28	X				X		X

[1]**This is not a complete list of products; other insecticides may be availablein similar formulations with the same active ingredient.**

[2]In this column, the "X" denotes efficacy against psyllids, if no letter follows then adults are controlled, if (e) then eggs, and if (n) then nymphs are controlled.

[3]Some commonly used pyrethroid products include Capture, Brigade, Renounce, Baythroid, Warrior, Mustang, Battalion, Asana.