Leafhoppers and Thrips – Unseen and Under-Appreciated Insects in Potatoes and Onions

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Wisconsin Fresh Fruit and Vegetable Growers Association

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Presentation Outline

• New tools (and active ingredients)

• Regulatory review of insecticides (US EPA and WI)

• Potato leafhopper (*Empoasca fabae*)

• Onion thrips (*Thrips tabaci*)
New, recent or existing registrations (potato)

- PQZ (pyrfluquinizone, Nichino America) – aphids only
- Sefina (afidopyropen, BASF) – aphids only
- Exirel (cyantraniliprole, FMC) – PLH, thrips
- Delegate (spinosad, Corteva) - thrips
- Sivanto HL (flupyradifurone, Bayer Crop Sci) - aphids, PLH (Group 4D) (soil and foliar)
- Transform (sulfoxaflor, Corteva) – thrips and PLH (Group 4C)
- Harvanta (cyclaniliprole) – (Summit Agro) – thrips

- OMRI-approved
- Venerate CG (Burkholderia spp.) – PLH nymphs and thrips
- BoteGHA ES (Beauvaria bassiana) – PLH nymphs and thrips
- PFR-97 (Isaria fumosorosea Apopka Strain 97, Certis USA) – thrips
2021 Vegetable Recommendations

Extension Resources

ICPM BioIPM series
- BioIPM Carrot Workbook
- BioIPM Cole Crops Workbook
- BioIPM Pepper Workbook
- BioIPM Potato Workbook
- BioIPM Snap Bean Workbook
- BioIPM Vine Crops Workbook
- More information at the UW-Extension ICPM site...

Vegetable production
- Commercial Vegetable Production in Wisconsin (A3422)
- IPM Perspectives for Carrot Foliar Disease in Wisconsin (A3945)
- Management of Potato Virus Y (PVY) in Wisconsin Seed Potato Production

Field crops
- Pest Management in Wisconsin Field Crops (A3646)

Biological control
- Biological Control of Insects and Mites (A3842)
- Biological Control of Greenhouse Pests (MCRG)

https://vegento.russell.wisc.edu/field-trials/
2020 Applied Research Highlights

Field Trials

Annual reports for summer field research assess pesticide efficacy and develop improved pest management recommendations. Tabular summaries of experiments performed are shown for recent years. Browse all trials on our Box server.

2020 Field Trials

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<tr>
<th>Crop</th>
<th>Location</th>
<th>Description</th>
<th>Appl.</th>
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<th>Target Pest(s)</th>
<th>Evaluation</th>
<th>Report</th>
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<td>Coloma</td>
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<td>Evaluation of two BT formulations against CPB</td>
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<td>Evaluation of an experimental foliar product for 1st-gen CPB management</td>
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<td>PVY</td>
<td>Yield, PVY incidence</td>
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<td>Diamondback moth, imported cabbageworm, cabbage looper</td>
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Corteva - Delegate vegetable registrations

- Blackhawk availability limited (2020/21) (spinosad)
- No changes in Entrust availability (spinosad)
- Delegate 3c registration (spinetoram)
- Radiant SC registration continues

https://www.kellysolutions.com/WI/searchbyproductname.asp
EPA Proposed Cancellation - chlorpyrifos

**Federal Register**

Chlorpyrifos; Cancellation Order

A Notice by the Environmental Protection Agency on 12/06/2000

**AGENCY:**
Environmental Protection Agency (EPA).

**ACTION:**
Notice.

**SUMMARY:**
This notice announces a cancellation order that was signed November 27, 2000, announcing the use deletions and cancellations as requested by the companies that held the registrations of pesticide products containing the active ingredient chlorpyrifos and accepted by EPA, pursuant to section 4(f) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). This order follows up a September 30, 2000, notice of receipt of requests for amendments to delete uses and receipt of a request for registration cancellations. In that notice, EPA indicated that it would issue an order confirming the voluntary use deletions and registration cancellations. Any distribution, sale, or use of canceled chlorpyrifos products is only permitted in accordance with the terms of the existing stocks and provisions of this cancellation order.

**DATES:**
The cancellations are effective December 1, 2000.

**Documents Details**
- Document Type: Notice
- Document Citation: 65 FR 78233, 78234 (2 pages)
- Document Number: 03-30917

**Agreement Reached to End Sale of Chlorpyrifos in California by February 2020**

Contact: Alex Manum, California Environmental Protection Agency
510-354-9707 / Alex.Manum@calepa.ca.gov
Contact: Charlotte Fadiga
510-449-6574 / Charlotte.Fadiga@calepa.ca.gov

Use in agriculture to be prohibited after next year
Alternatives to Chlorpyrifos Work Group to hold public meeting in January

En Español
(Sacramento) - The California Environmental Protection Agency announced today that virtually all uses of the pesticide chlorpyrifos in California will end next year following an agreement between the Department of Pesticide Regulation (DPR) and pesticide manufacturer to withdraw their products.

“For years, environmental justice advocates have fought to get the harmful pesticide chlorpyrifos out of our communities,” said Governor Gavin Newsom. “Thanks to their tenacity and the work of countless others, this will now occur faster than originally envisioned. This is a big win for children, workers and public health in California.”

**Corteva Announces It Will Discontinue Making Insecticide Chlorpyrifos**

Corteva AgriScience says it will stop making chlorpyrifos (klor-peer-ih-foss) insecticide by years end. In a statement given to Brownfield, Corteva calls it a "strategic business decision" because of falling sales of the chemical. The state of California stopped sales of chlorpyrifos this week.

Corteva says its customers “will have access to enough chlorpyrifos supply to cover current demand through the end of the year, while they transition to other products or other providers.” Corteva is the top maker of the insecticide: Environmental groups claim it causes neurological problems and are suing the EPA for denying a petition to ban it.

Corteva Statement: Corteva AgriScience has one of the largest and most diverse product pipelines in the industry with multiple exciting, upcoming brand launches. Demand for one of our long-standing products, chlorpyrifos, has declined significantly over the last two decades, particularly in the U.S.
EPA Releases Proposed Interim Decisions for Neonicotinoids

For Release: January 30, 2020

EPA is taking the next step in its regulatory review of neonicotinoid pesticides - a group of insecticides used on a wide variety of crops, turf, ornamentals, pets (for flea treatment), and other residential and commercial indoor and outdoor uses. The agency’s proposed interim decisions for acetamiprid, clothianidin, dinofluburin, imidacloprid, and thiamethoxam contain new measures to reduce potential ecological risks, particularly to pollinators, and protect public health.

EPA is proposing:

- management measures to help keep pesticides on the intended target and reduce the amount used on crops associated with potential ecological risks;
- requiring the use of additional personal protective equipment to address potential occupational risks;
- restrictions on when pesticides can be applied to blooming crops in order to limit exposure to bees;
- language on the label that advises homeowners not to use neonicotinoid products; and
- cancelling spray uses of imidacloprid on residential turf under the Food Quality Protection Act (FQPA) due to health concerns.

Additionally, the agency is working with industry on developing and implementing stewardship and best management practices.

https://www.epa.gov/pesticides/epa-releases-proposed-interim-decisions-neonicotinoids
What are neonicotinoid insecticides?

- Class chemically similar to nicotine
- Developed in early 90’s as a safer alternative to older, toxic insecticides
- Insect central nervous system toxins
- Typically applied as a seed coat, soil drench, or foliar application
- Used against many pests in many crop production systems
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Potato leafhopper

Appearance
- Adults, small (1/8"") wedge-shaped, bright green
- Rapid movement
- Nymphs, yellow-green, lack wings

Occurrence
- Does not overwinter in Wisconsin
- Adults migrate from gulf states
- Arrive June, 2-3 generations/year
- Very broad host range includes potatoes, beans, alfalfa
- Can infest quickly
Potato leafhopper: long distance migration

HYSPLIT air parcel trajectory model

Simulated transport and deposition of PLH “particles”

Transported by bulk air flow from regions where winged PLH may be present

Illustrating 1, 24 h periods

Potato leafhopper - phloem feeders

- Both adults and nymphs feed
- Sucking mouthparts
- Saliva clogs phloem – root death
- Water loss, leaf necrosis
- Can kill young plants quickly
- May only cause stunting

Treated with insecticides
Potato Leafhopper – damage

'\textbf{Hopperburn}'

potato

alfalfa
Potato Leafhopper – tolerant varieties (pubescent)
## Potato leafhopper – Varietal Susceptibility

### Whites < Reds < Russet < Yellow

<table>
<thead>
<tr>
<th>Clone</th>
<th>Average Yield (lbs./ 40 row ft.)</th>
<th>% Reduction</th>
<th>Prob &gt; T*</th>
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<tr>
<td></td>
<td>Untreated</td>
<td>Treated</td>
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<tr>
<td>All Blue</td>
<td>8.4</td>
<td>24.1</td>
<td>65.1</td>
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<td>Carola</td>
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<tr>
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<td>21.1</td>
<td>34.2</td>
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<tr>
<td>Butte</td>
<td>29.3</td>
<td>46.3</td>
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<td>French Fingerling</td>
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<td>44</td>
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<tr>
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<tr>
<td>NY 131</td>
<td>36.1</td>
<td>35.9</td>
<td>-0.6</td>
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</table>
Potato leafhopper – Varietal Susceptibility
Potato leafhopper management

Cultural
- Plant early to avoid

Biological
- Few effective biologicals

Chemical
- Monitor often (June 1)
- Treat only when threshold exceeded (1 / sweep)
- Tolerant varieties (1-2 / sweep)

- Do not let nymphs build up

- Control is effective if needed:
  pyrethrins = Evergreen, Pyganic
Onion Thrips, *Thrips tabaci* Lindeman

- **Adult**
- **Larva**

Dry-bulb onion

Storage cabbage

*J. Ogrodnick*
Biological attributes that make onion thrips a pest

- Short developmental time – hot/dry conditions
- Parthenogenic (do not need to find a mate)
- Highly mobile
- Wide host range
- Overwinter adjacent to onion
- Capability of developing resistance to insecticides
Onion thrips: Management

**Cultural**
- Crop rotation
- Overhead irrigation
- Sanitation (culls & field borders)
- Reflective mulch

**Biological**
- Predacious thrips
- Minute pirate bugs

**Chemical**
- Foliar sprays (Surround, Entrust, Aza-Direct, PFR-97, Venerate)
- Commercial seed treatments (Regard SC)
Conventional Approach for Managing Onion Thrips in Onion

Example from Wisconsin

*Thrips tabaci* may produce 3 to 4 generations in a field, requiring 6 to 8 weeks of protection.

Insecticide sprays

Planting

Onions

Harvest

Pest Specific Insecticides – Onion Thrips

Reduced-Risk Products

- spirotetramat (Movento HL)
  - 3 day PHI, dual systemicity, thrips/nematodes

- abamectin (Agri-Mek SC, generics)
  - 30 day PHI, trans-laminar, thrips/leafminers

- spinetoram (Radiant SC)
  - 1 day PHI, non-systemic, thrips/caterpillars

- cyantraniliprole (Exirel)
  - 1 day PHI, translaminar, thrips/leafminer/caterpillars
Pest Specific Insecticides – Onion Thrips

OMRI-approved products

- Spinosad (Entrust)
- Azadirachtin (Aza-Direct, AzaGuard, Azatin)

*Chromobacterium subtsugae* strain PRAA4-1\(^T\) (Grandevo)

*Burkholderia* spp, strain A396 (Venerate XC)

**Note:** Avoid Broad Spectrum Insecticides!!

- Pyrethrum
  - Multiple applications
  - Resistance can be a problem
  - Eliminate biological controls
Combining Insecticide Sequences and Action Thresholds – Conventional Options

*3 immature thrips (larvae) / leaf

Need to protect crop from thrips for 6-8 weeks

- *Movento*
- *Exirel*
- *Radiant*

Planting


Harvest

Onions

Thrips

 WIСONISN UNIVERSITY OF WISCONSIN-MADISON
Combining Insecticide Sequences and Action Thresholds – OMRI Options

*1-3 thrips / leaf

Need to protect crop from thrips for 6-8 weeks

- Planting
- Onions
- Harvest

- *Aza-Direct
- *Venerate
- *Entrust
Insecticide Control Options

- Rotate insecticides (classes if possible)
  
  e.g., azadirachtin, spinosad, kaolin, Isaria, etc..

- Two successive applications of one product to control a generation

- Time applications based on most appropriate threshold (1-3 immature thrips / leaf)

- Avoid tank mixing insecticides
Acknowledgements

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• University of Wisconsin, College of Agricultural and Life Sciences
• University of Wisconsin, Agricultural Experiment Stations

http://labs.russell.wisc.edu/vegento/