

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



2021
Extension
Publications

Quick Links

- Field Trials
- Pest Factsheets
- Crop Information
- Research Projects
- Extension Publications
- Publications
- Lab Members

Off-site Resources

- Related sites:
- Entomology Department
 - Plant Pathology Department
 - Horticulture Department
 - Insect Diagnostic Lab
 - Plant disease diagnostic clinic

Newsletters:

- UW-IPCM vegetable crop update newsletter
- WI-DATCP pest bulletin

Degree-day modeling:

- USPest DD models
- USPest DD map maker

Extension Resources

UW-Extension Publications

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

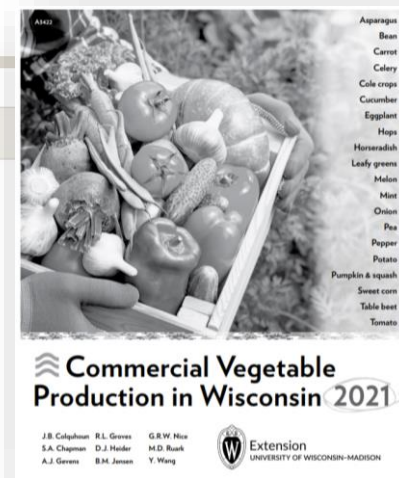
- [Commercial Vegetable Production in Wisconsin \(A3422\)](#)
- [IPM Perspectives for Carrot Foliar Disease in Wisconsin \(A3945\)](#)
- [Management of Potato Virus Y \(PVY\) in Wisconsin Seed Potato Production](#)

Field crops

- [Pest Management in Wisconsin Field Crops \(A3646\)](#)

Biological control

- [Biological Control of Insects and Mites \(A3842\)](#)
- [Biological Control of Greenhouse Pests \(NCR 581\)](#)



2020 Applied Research Highlights

University of Wisconsin-Madison
Vegetable Crop Entomology
Extension and Research

Wisconsin Vegetable Entomology

Research ▾ Extension ▾ Crops & Insects ▾ IPM ▾ Lab Members 🔍

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trials/# 6Pest DD map maker

Field Trials

Annual reports for summer field research improved pest management recommendations present. Tabular summaries of experiments performed are shown for recent years. [Browse all trials on our Box server.](#)

2020 Field Trials

Crop	Location	Description	Appl.	Trts	Target Pest(s)	Evaluation	Report	Publication
Potato	Coloma	Potato aphid management	Foliar	6	Aphid	Insect counts	PDF	
Potato	HARS	Evaluation of two BT formulations against CPB	Foliar	8	CPB	Insect counts, defoliation	PDF	
Potato	HARS	Evaluation of an experimental at-plant for 1st-gen CPB management	Systemic	8	CPB	Insect counts, defoliation	PDF	
Potato	HARS	Evaluation of an experimental foliar product for 1st-gen CPB management	Foliar	8	PVY	Yield, PVY incidence	PDF	
Cabbage	Arlington	Lepidoptera management	Foliar	8	Diamondback moth, imported cabbageworm, cabbage looper	Larval counts	PDF	

2020 Applied Research Highlights

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Corteva - Delegate vegetable registrations



State of Wisconsin
Department of Agriculture, Trade and Consumer Protection

Product Information

Product Name: [Delegate WG Insecticide](#)
EPA Registration No.: 62719-541

Expiration Date: 12/31/2021
Registration Status: Active
Company Name and Reg. No.: [Dow AgroSciences LLC](#) [62719]
Formulation: Water Dispersible Granules
Restricted Use? N
Pesticide Type: Insecticide

Click here to show [Active Ingredients](#) in this Product.

Click here to show the [Pests Controlled by this Product](#).

Click here to show the [Sites to which this Product may be Applied](#).

Click here to [View Product Label](#) (revision date: 7/29/2016 4:22:00 PM)

Click here to view the [EPA Stamped Labels](#) for the selected product (external link)

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

A5B / Delegate WG / MSTR Amend with Edits / 02-11-20

Page 1

(Base label):

SPINETORAM	GROUP	5	INSECTICIDE
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Delegate® WG

INSECTICIDE

For control or suppression of lepidopterous larvae (worms, caterpillars), dipterous leafminers, thrips, and certain psyllids in asparagus, banana and plantain, *Brassica* cole crops, bulb vegetables, bushberries, caneberries, cereal grains (except rice, millet and sorghum), citrus, coffee, corn (field, sweet, popcorn, and seed corn), cotton, cranberry, cucurbits, dates, fig, fruiting vegetables (tomato, peppers, and eggplant), globe artichoke, grain amaranth, grape, herbs, hops, leafy vegetables, leaves of legume vegetables, leaves of root and tuber vegetables, legume vegetables (succulent and dried beans and peas), okra, peanut, peppermint, pineapple, pistachios, pome fruits, pomegranate, quinoa, root and tuber vegetables, root vegetables, soybean, spearmint, spices (except black pepper), stone fruits, strawberry, teosinte, tree nuts, tropical tree fruits, turnip greens and watercress.

Active Ingredient:
spinetoram (a mixture of
spinetoram-J and spinetoram-L)25.0%
Other Ingredients75.0%
Total100.0%

Contains 25% active ingredient on a weight basis (250 g ai/kg)

Keep Out of Reach of Children
CAUTION

Precautionary Statements

Hazards to Humans and Domestic Animals

ACCEPTED
02/14/2020
Under the Federal Insecticide, Fungicide
and Rodenticide Act as amended, for the
pesticide registered under
EPA Reg. No. 62719-541

EPA Proposed Cancellation - chlorpyrifos



**FEDERAL REGISTER**
The Daily Journal of the United States Government



Notice

Chlorpyrifos; Cancellation Order

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

PUBLISHED DOCUMENT

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 hold the registrations of pesticide products containing the active ingredient chlorpyrifos and accepted by EPA, pursuant to section 6(f) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). This order follows up a September 20, 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 provisions of this cancellation order.

DATES:
The cancellations are effective December 1, 2000.

DOCUMENT DETAILS

Printed version:
PDF

Publication Date:
12/06/2000

Agency:
Environmental Protection Agency

Dates:
The cancellations are effective
December 1, 2000.

Effective Date:
12/01/2000

Document Type:
Notice

Document Citation:
65 FR 76233

Page:
76233-76240 (8 pages)

Agency/Docket Numbers:
OPP-34203F
FRL-6758-2

Document Number:
00-30917

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



Contact: Alex Barnum, California Environmental Protection Agency
916-324-9670 | Alex.Barnum@calepa.ca.gov
Contact: Charlotte Fadipe
916-445-3974 | Charlotte.Fadipe@cdpr.ca.gov

October 9, 2019 (19-01)
FOR IMMEDIATE RELEASE

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 use of the pesticide chlorpyrifos in California will end next year following an agreement between the Department of Pesticide Regulation (DPR) and pesticide manufacturers 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

February 9, 2020



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.

[Environmental Topics](#)[Laws & Regulations](#)[About EPA](#)[CONTACT US](#)[SHARE](#)

Pesticides

[Pesticides Home](#)[A-Z Index](#)[Bed Bugs](#)[Antimicrobial Pesticides](#)[Biopesticides](#)[Freedom of Information Act Requests](#)[International Activities Related to Pesticides](#)[Pest Control and Pesticide Safety for Consumers](#)[Pesticide Registration](#)

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, dinotefuran, imidacloprid, and thiamethoxam contain new measures to reduce potential ecological risks, particularly to pollinators, and protect public health.

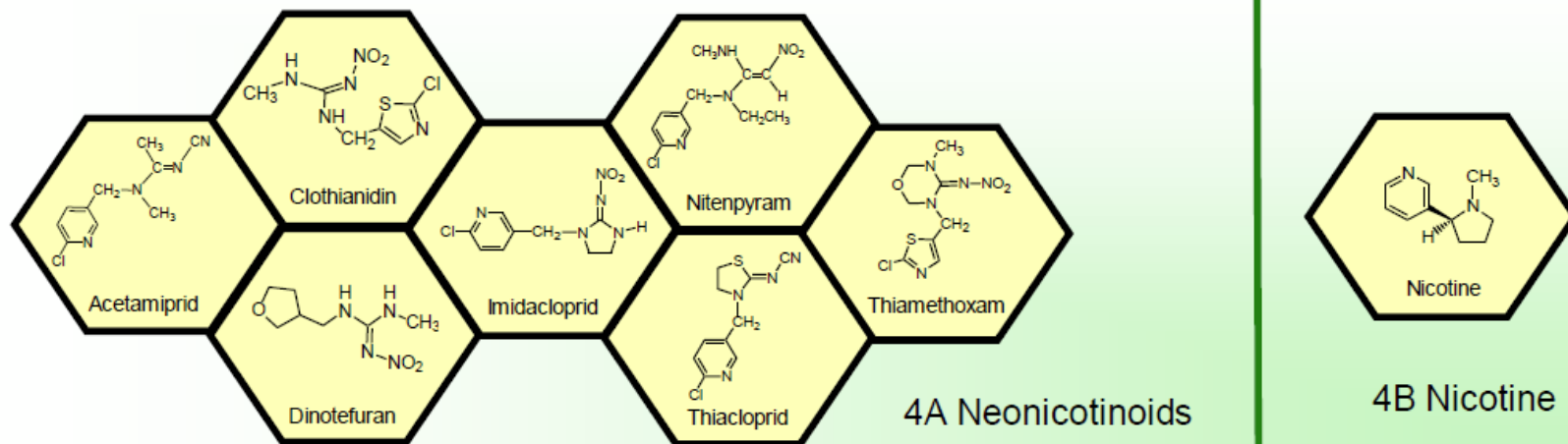
EPA is proposing:

- 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.

What are neonicotinoid insecticides?

Group 4: Nicotinic acetylcholine receptor agonists



Insecticide Resistance Action Committee

- 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

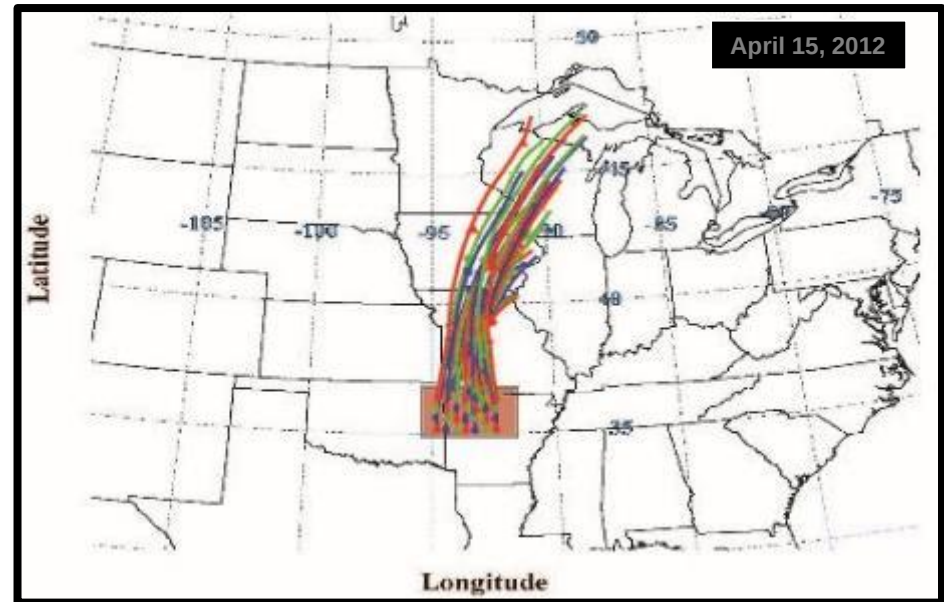
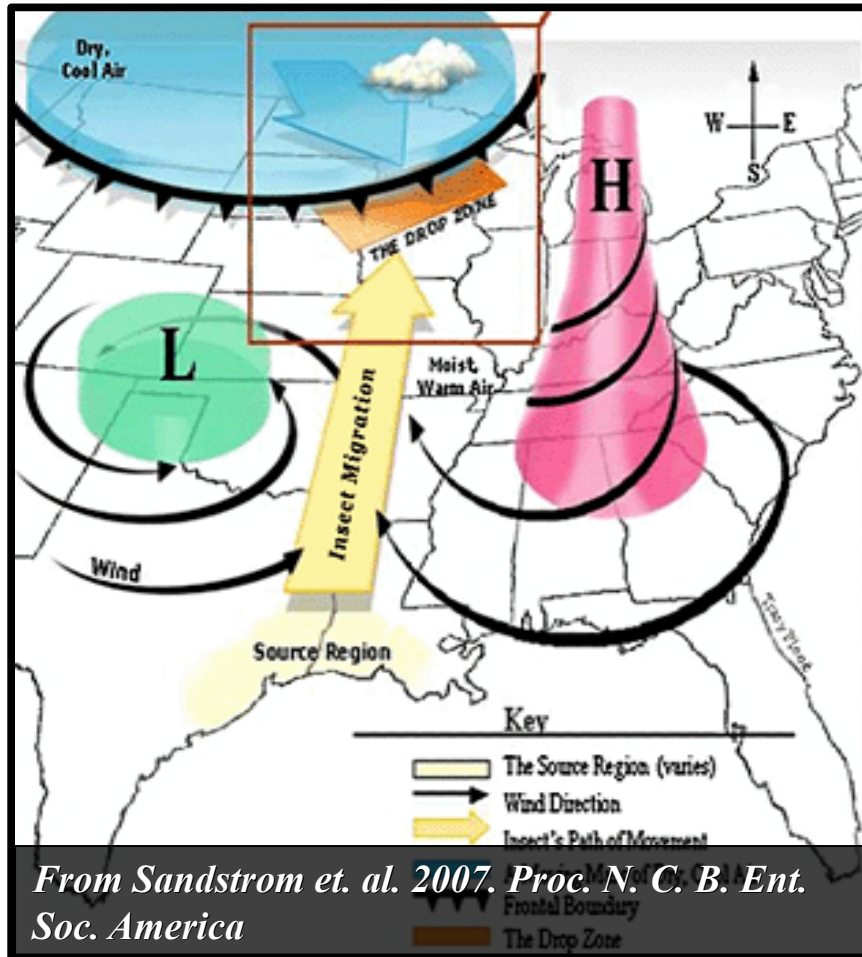
Appearance

- ❖ 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"

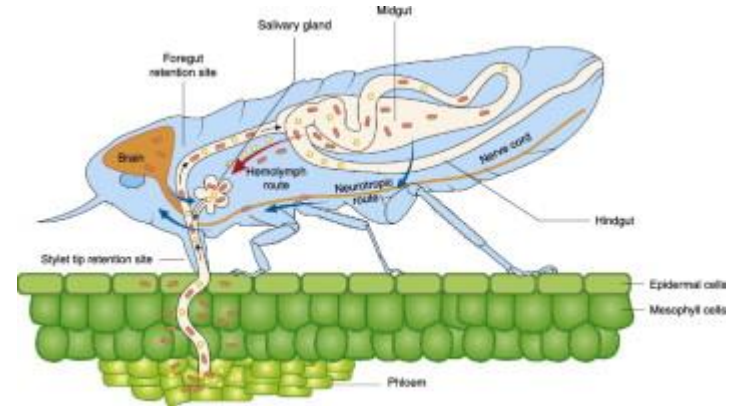
Transported by bulk air flow from regions where winged PLH may be present

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



Potato Leafhopper – damage



alfalfa



potato

‘Hopperburn’

Potato Leafhopper – tolerant varieties (pubescent)



Potato leafhopper – Varietal Susceptibility

Whites < Reds < Russet < Yellow

Clone	Average Yield (lbs./ 40 row ft.)		% Reduction	Prob > T*
	Untreated	Treated		
All Blue	8.4	24.1	65.1	0.0008
Carola	16.6	35.3	53.0	0.006
Kennebec	23.9	38.8	38.4	0.02
Red Norland	21.1	34.2	38.3	0.09
Butte	29.3	46.3	36.7	0.03
French Fingerling	20.8	32.8	36.6	0.08
Russian Banana	35	44	20.5	0.25
Elba	31.4	38.3	18.0	0.33
Yukon Gold	36.1	40.6	11.1	0.44
Prince Hairy	44.8	49.9	10.2	0.5
All Red	49.3	54.3	9.2	0.43
NY 131	36.1	35.9	-0.6	0.95

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

Dry-bulb onion



Adult



Larva



Storage cabbage



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)

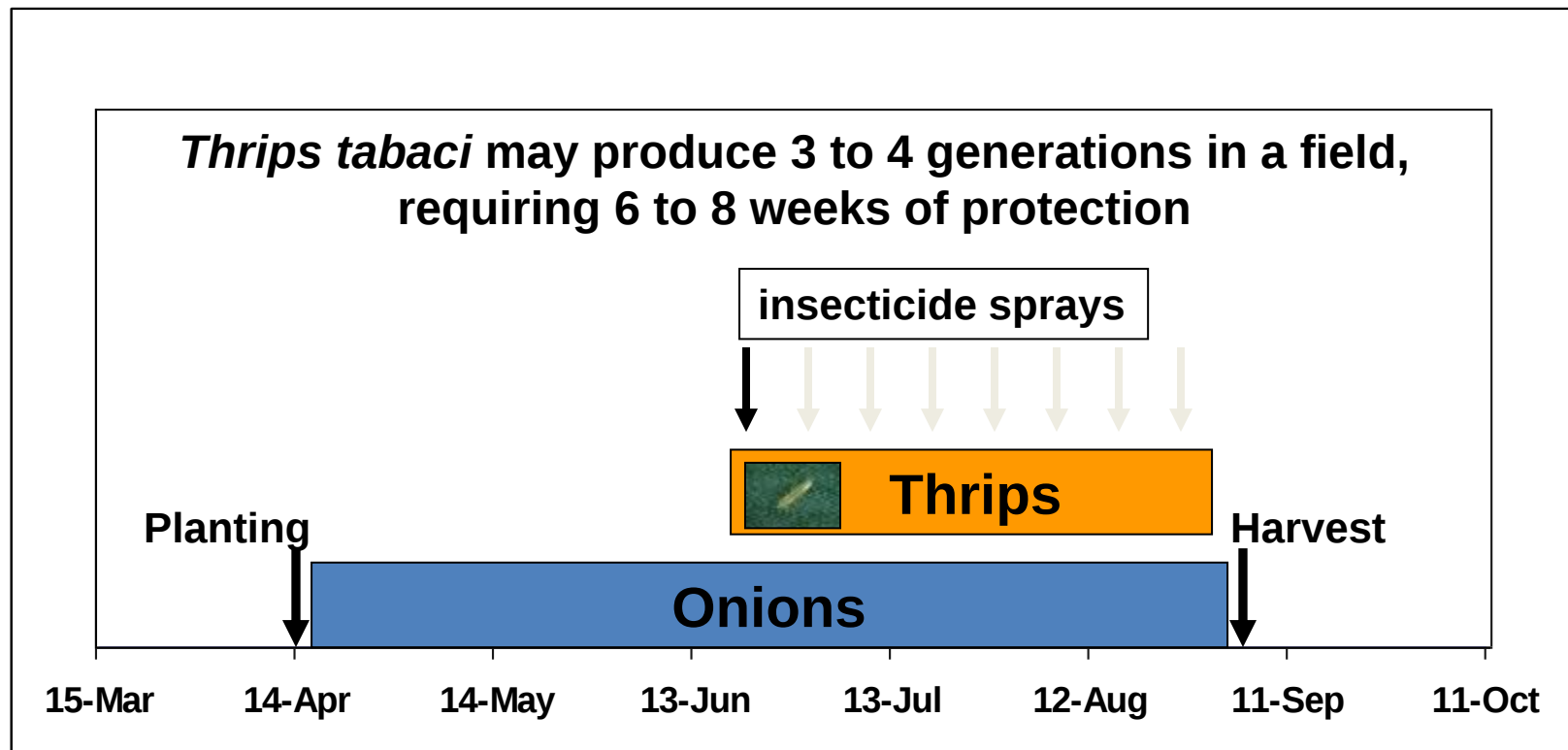


Leptothrips



Conventional Approach for Managing Onion Thrips in Onion

Example from Wisconsin



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

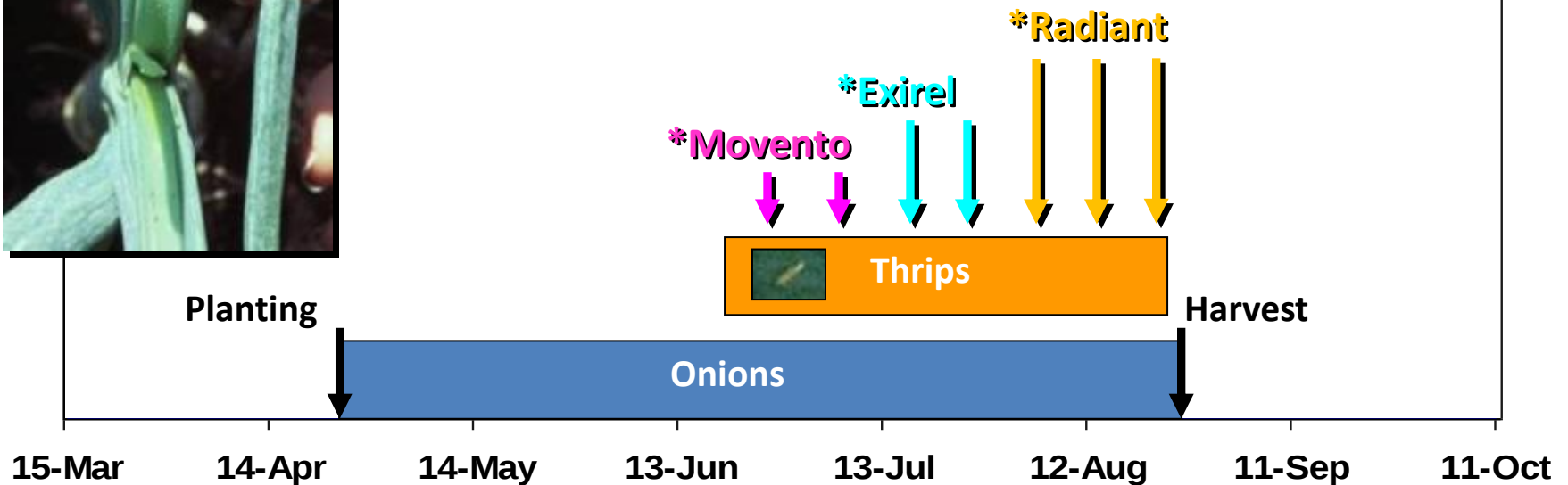


Combining Insecticide Sequences and Action Thresholds – Conventional Options

*3 immature thrips (larvae) / leaf



Need to protect crop from thrips for 6-8 weeks

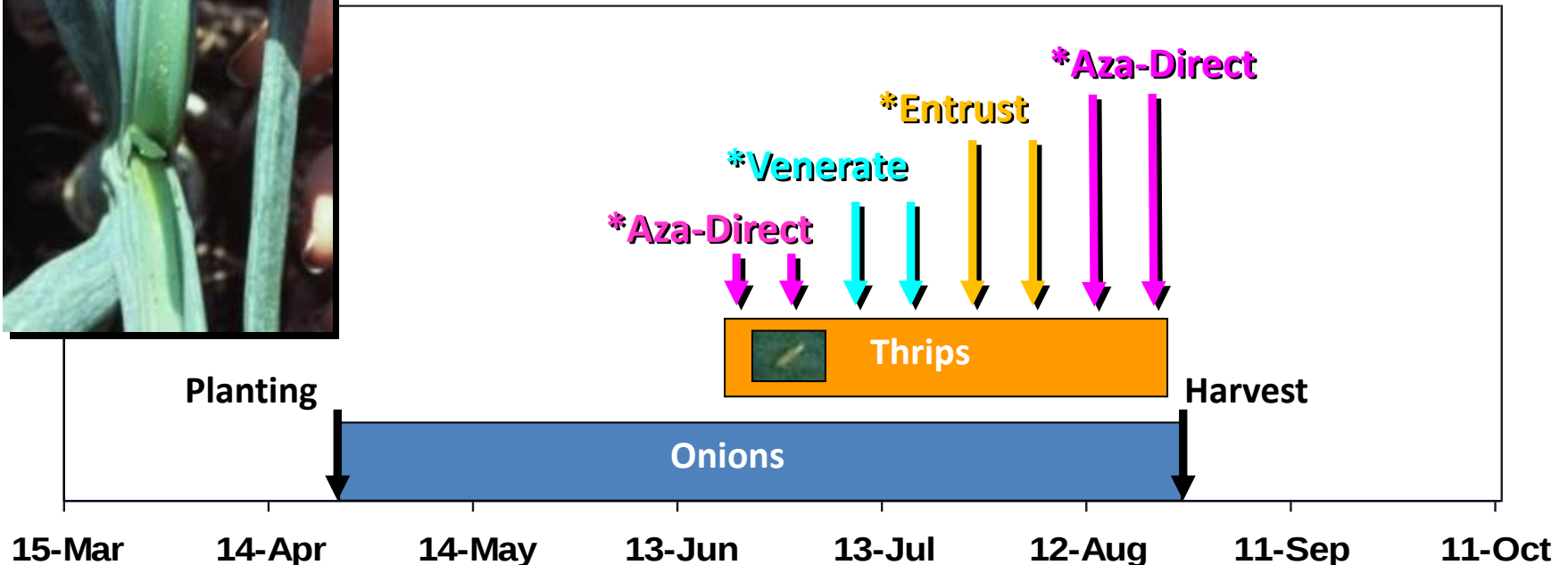


Combining Insecticide Sequences and Action Thresholds – OMRI Options

*1-3 thrips / leaf



Need to protect crop from thrips for 6-8 weeks



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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- Dr. Scott A. Chapman
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- Dr. David Lowenstein
- Wisconsin Fresh Fruit and Vegetable Growers Association



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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/>