Onion Thrips Management in 2022 and Beyond & Seed Treatment Update

Great Lakes Fruit and Vegetable EXPO
December 7, 2022

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New York State Agricultural Experiment Station

Outline

I. Onion thrips

- Refresher on thrips biology and management
- Advice about using Movento/Senstar and Radiant
- Guidelines for season-long control

II. Onion maggot

- Update on insecticide seed treatments

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Onion thrips, *Thrips tabaci*

Photo: I. Yannuzzi

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Onion thrips, *Thrips tabaci*

Photo: J. Ogrodnik

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Onion thrips damage

- ✓ Thrips feeding can indirectly reduce bulb weight by 60%

Photo: B. Nault

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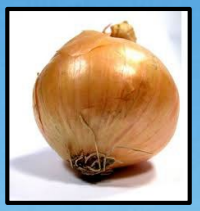
Onion thrips damage



- ✓Thrips adults migrate from maturing fields to younger ones

Photo: B. Nault

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Onion thrips damage

- ✓Onion thrips feeding can facilitate pathogen spread

- *Iris yellow spot orthotospovirus* (Iris yellow spot)

- *Pantoea ananatis* (bacterial center rot)

- *Alternaria porri* (Purple blotch)

- *Stemphylium vesicarium* (Stemphylium leaf blight)

Gent et al. 2006; Dutta et al. 2014; Bag et al. 2015; Leach et al. 2020

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Onion plants killed prematurely by onion thrips and IYSV

Photo: B. Nault

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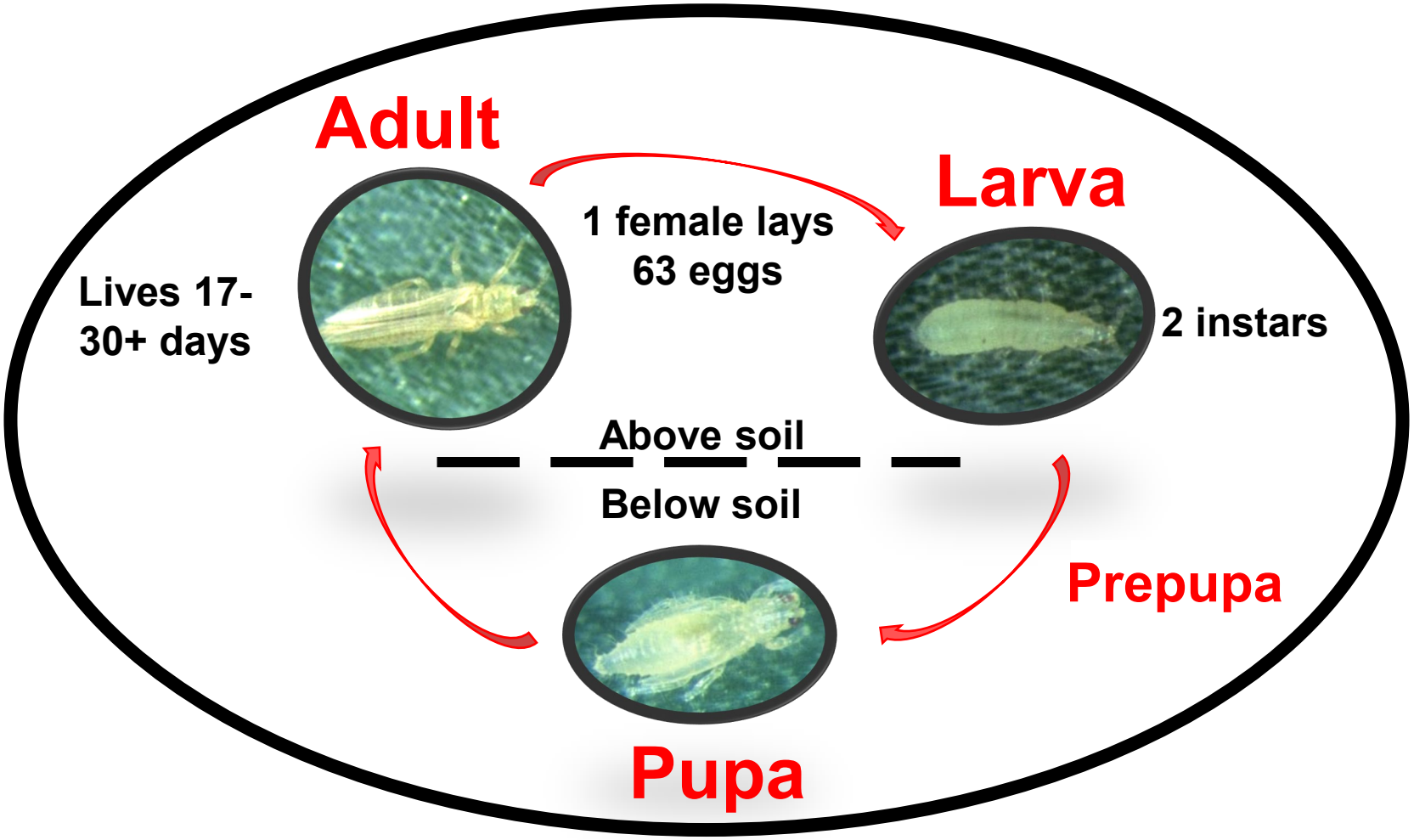
Onion thrips life cycle



*Generation completed in 17 days @ 84° F

Onion thrips infest onion fields when plants have ~3-4 leaves


Photo: I. Yannuzzi

Planting/ Transplanting
(late March – early June)

ONION THRIPS

Harvest
(late July – Sept.)

ONION GROWING SEASON

MAY JUNE JULY AUG SEPT

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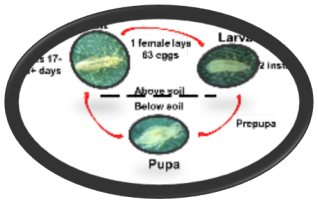
Onion thrips infest onion fields when plants have ~3-4 leaves

1



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MAY JUNE JULY AUG SEPT

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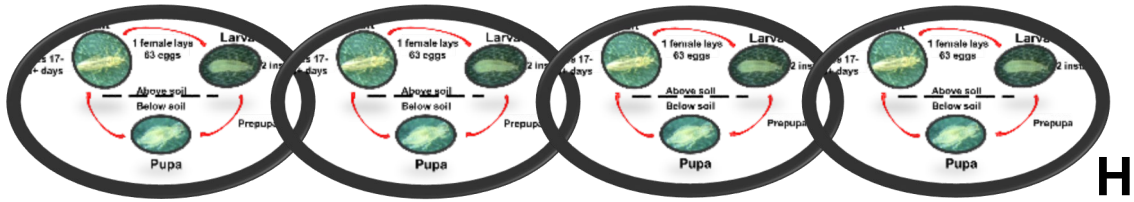
Multiple generations of onion thrips are produced in an onion field


Photo: I. Yannuzzi

*Thrips may produce 1 to 4 generations in a field before harvest

1 2 3 4



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ONION THRIPS

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MAY JUNE JULY AUG SEPT

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Management Tactics

1) Chemical control

2) Resistance

5) Behavioral control

3) Cultural control

4) Biological control

Management Tactics

1) Chemical control

2) Resistance

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3) Cultural control

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Chemical Control

➢ Advantages

- Effective
- Practical/ easy to use
- Also reduces incidence of some diseases (i.e., IYSV & Stemphylium leaf blight)

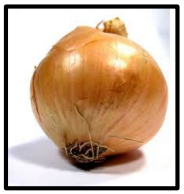
➢ Disadvantages

- Insecticide resistance
- Negative impacts on non-target organisms

Conventional insecticides used for thrips management in onion

Product Name	Chemical Name	IRAC class	Restrictions for thrips
Agri-Mek SC	abamectin	6	2 sequential applications then rotate to another class
EXIREL INSECT CONTROL	cyantraniliprole	28	2 sequential applications then rotate to another class
Minecto Pro	abamectin + cyantraniliprole	6 + 28	2 sequential applications only
MOVENTO	spirotetramat	23	2 sequential applications only
Radiant SC INSECTICIDE	spinetoram	5	2 sequential applications then rotate to another class
Senstar INSECTICIDE	spirotetramat + pyriproxyfen	23 + 7C	2 applications only

Key insecticide resistance management steps for thrips



1) <u>Rotate</u> active ingredients from different classes
   - Only use product twice
   - Apply products consecutively

2) <u>Use action thresholds</u> to limit use of active ingredients

3) Follow a <u>season-long program</u>

Inspired by IRAC Insecticide Resistance Action Committee

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STEP 1: Rotate products and apply in a season-long sequence

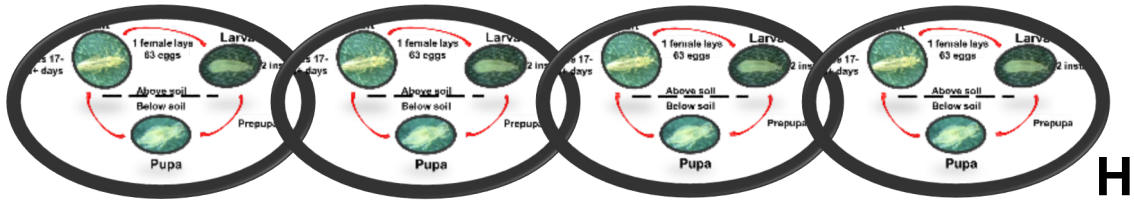
MOVENTO

Agri-Mek SC

EXIREL INSECT CONTROL

Radiant SC INSECTICIDE

1 2 3 4



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ONION THRIPS

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ONION GROWING SEASON

MAY JUNE JULY AUG SEPT

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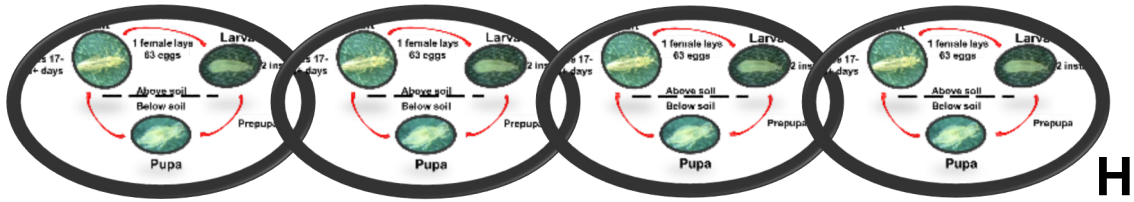
STEP 2: Use an action threshold to determine if application is needed

MOVENTO

EXIREL INSECT CONTROL

Radiant® SC INSECTICIDE

1 2 3 4



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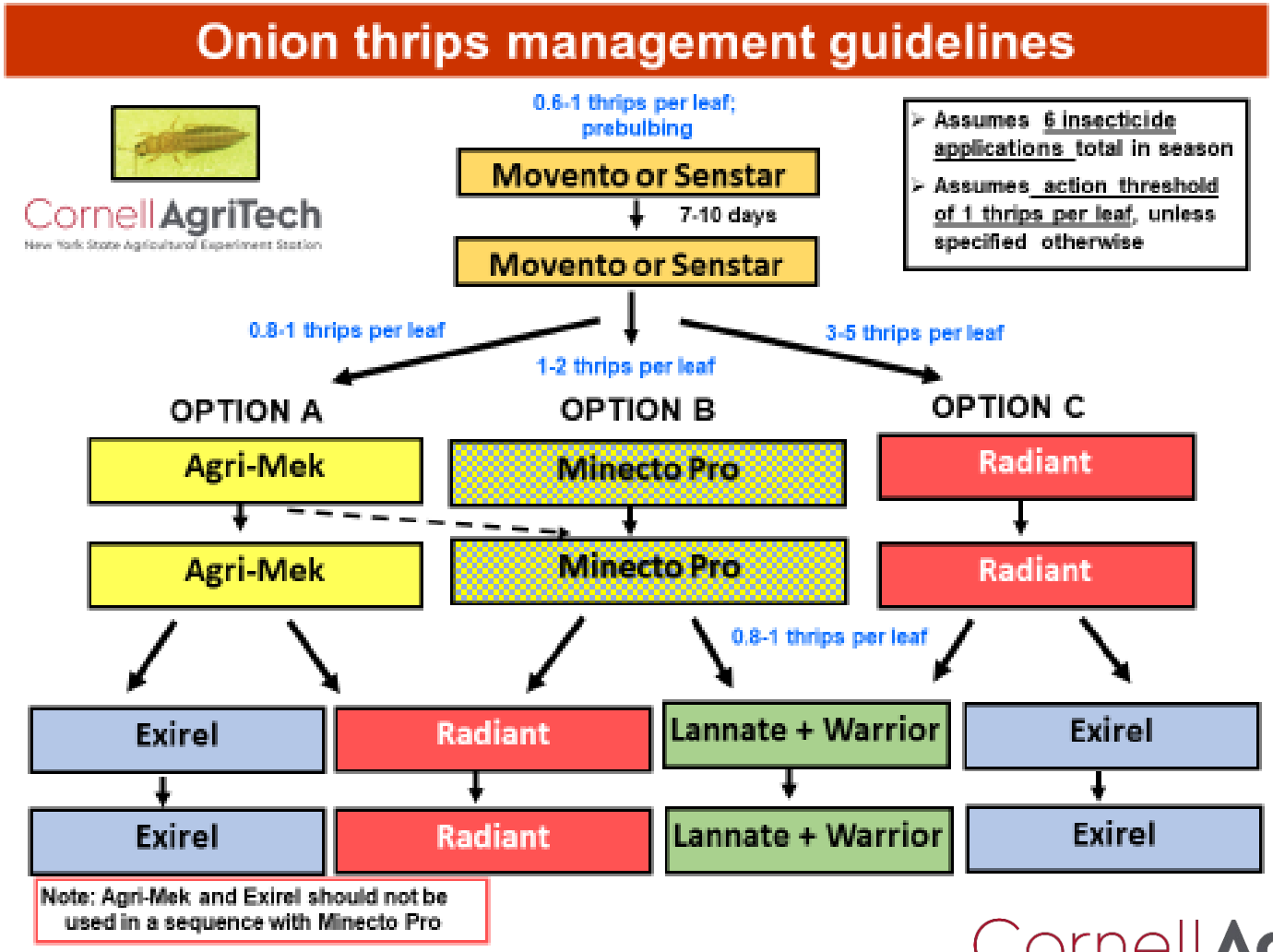
STEP 3: Follow the most current Onion Thrips Management Guidelines



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Onion thrips management guidelines

0.6-1 thrips per leaf; prebulbing

Movento or Senstar

7-10 days

Movento or Senstar

ASSUMPTIONS

- Total of 6 insecticide applications in a season
- Use an action threshold of 1 thrips per leaf, unless specified otherwise

"low thrips pressure"
0.6-1 thrips per leaf

"normal thrips pressure"

"high thrips pressure"

OPTION A	OPTION B	OPTION C
Agri-Mek	Minecto Pro	Radiant
Agri-Mek	Minecto Pro	Radiant

0.6-1 thrips per leaf

Exirel	Radiant	Lannate + Warrior	Exirel
Exirel	Radiant	Lannate + Warrior	Exirel

Note: Agri-Mek and Exirel should not be used in a sequence with Minecto Pro
Agri-Mek and Minecto Pro have 30 day pre-harvest restrictions

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Question: Is a surfactant needed with Movento/ Senstar?

Onion thrips management guidelines

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0.6-1 thrips per leaf; prebulbing

Movento or Senstar

7-10 days

Movento or Senstar

- Assumes 6 insecticide applications total in season
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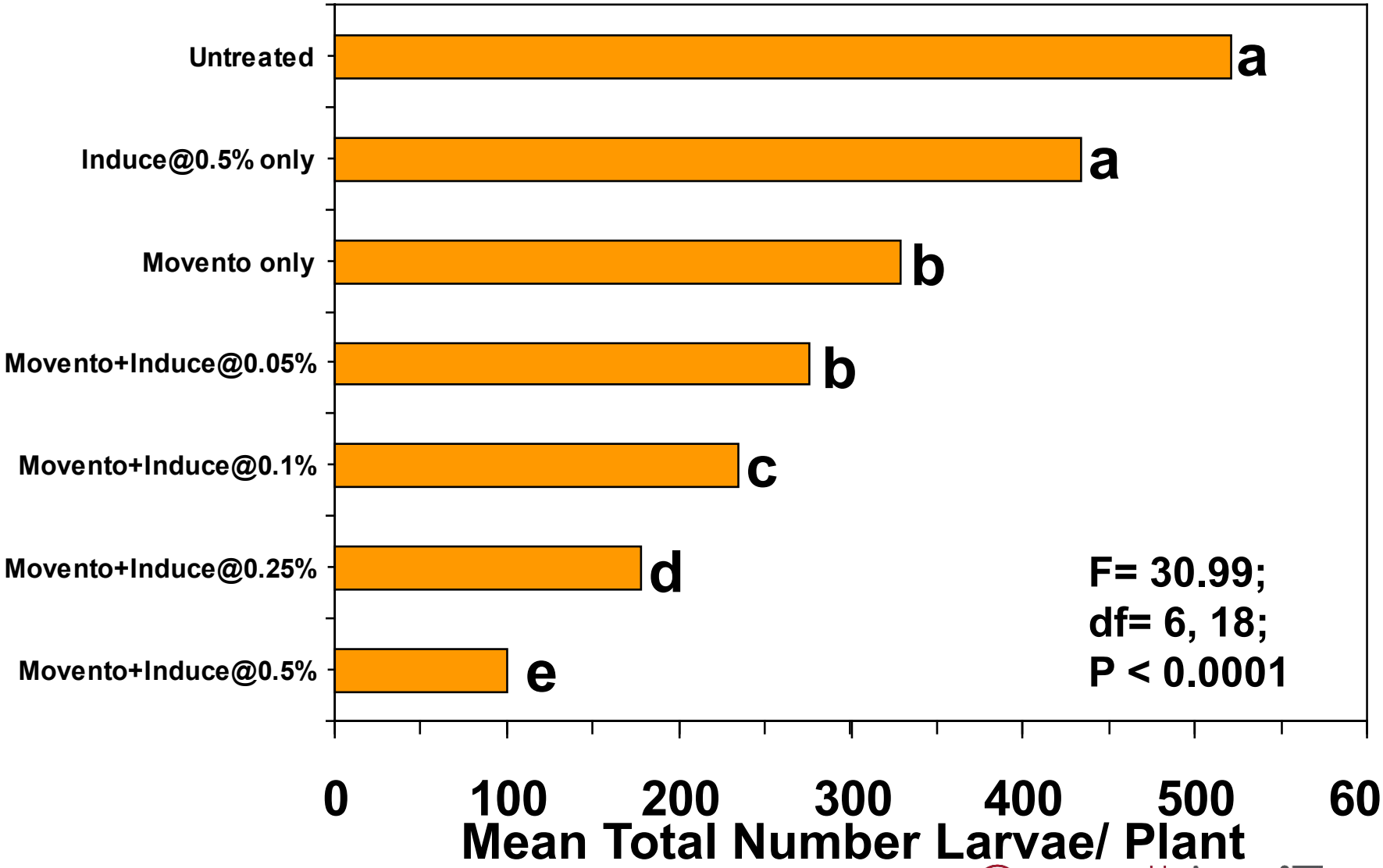
Evaluation of Movento Co-applied with Various Rates of a Surfactant

Insecticide	Surfactant
Untreated control	
-	Induce @ 0.5% v:v
Movento@ 5 fl oz/A	-
Movento@ 5 fl oz/A	Induce @ 0.05% v:v
Movento@ 5 fl oz/A	Induce @ 0.1% v:v
Movento@ 5 fl oz/A	Induce @ 0.25% v:v
Movento@ 5 fl oz/A	Induce @ 0.5% v:v

Onion Thrips Control in Onion

(Total after 2 weekly sprays)

Elba, NY 2011



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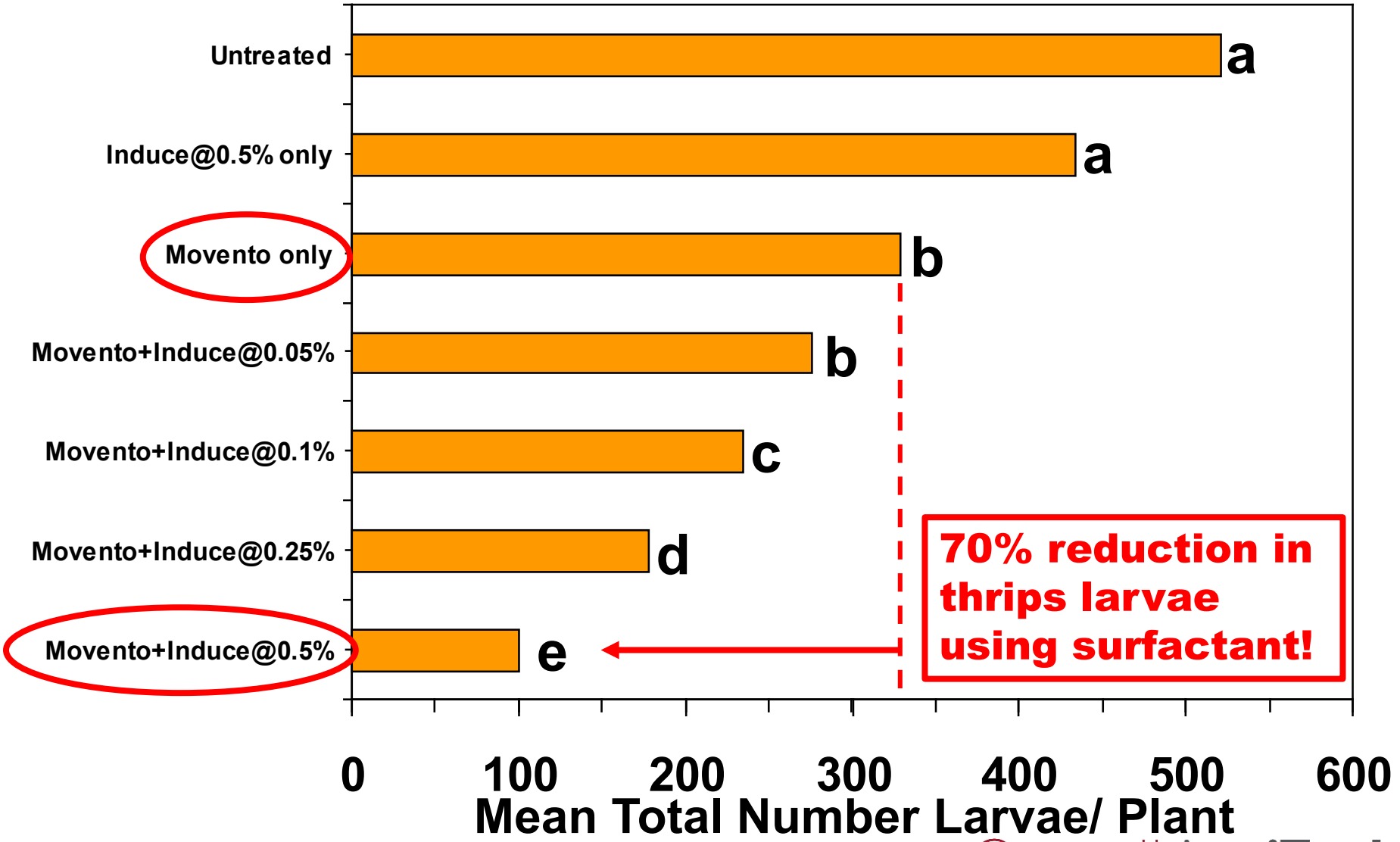
Onion Thrips Control in Onion

(Total after 2 weekly sprays)

Elba, NY 2011



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Question: Is a surfactant needed with Movento/ Senstar?

Answer: YES!!!

Onion thrips management guidelines

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0.6-1 thrips per leaf; prebulbing

Movento or Senstar

↓ 7-10 days

Movento or Senstar

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Question: Why start program with Movento/ Senstar?

Onion thrips management guidelines

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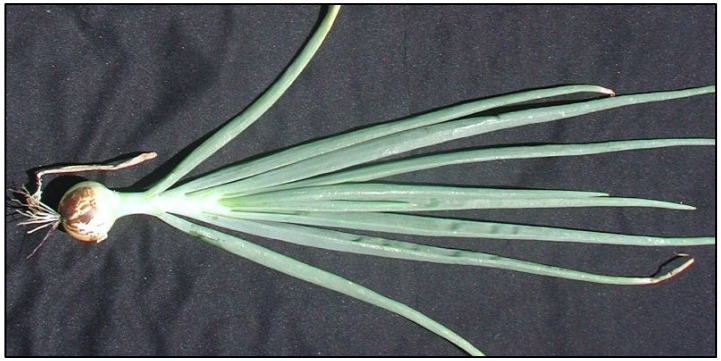
MOVENTO

Senstar INSECTICIDE

1) Take advantage of spirotetramat's systemicity

Moves to leaf axil where thrips hide



Do <u>not</u> use when plants begin bulbing

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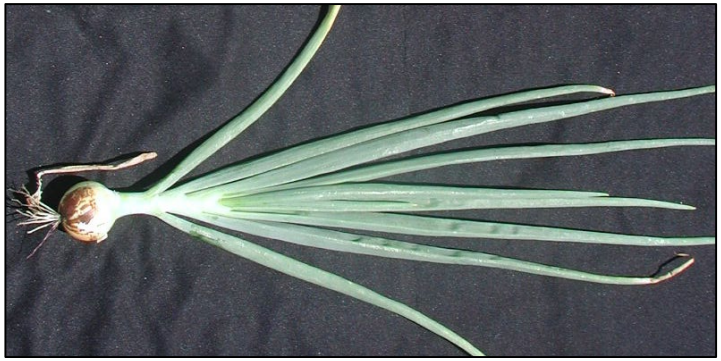

Do <u>not</u> use when plants begin bulbing

2) Use early when adult populations are lowest

Adult

<

Larva

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Question: Why start program with Movento/ Senstar?

Answer: Effective early, not late

Onion thrips management guidelines

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0.6-1 thrips per leaf; prebulbing

Movento or Senstar

7-10 days

Movento or Senstar

- Assumes 6 insecticide applications total in season
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Question: What is the best threshold for Movento/ Senstar and are 2 sprays needed?

Onion thrips management guidelines

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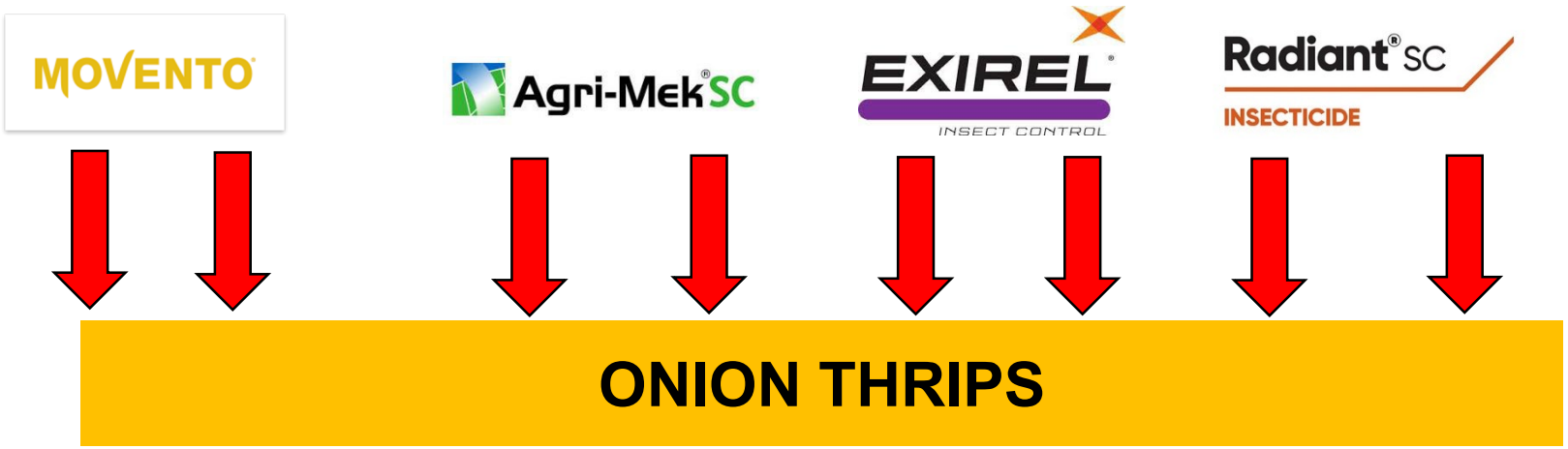
Movento applications beginning as soon as thrips are observed?



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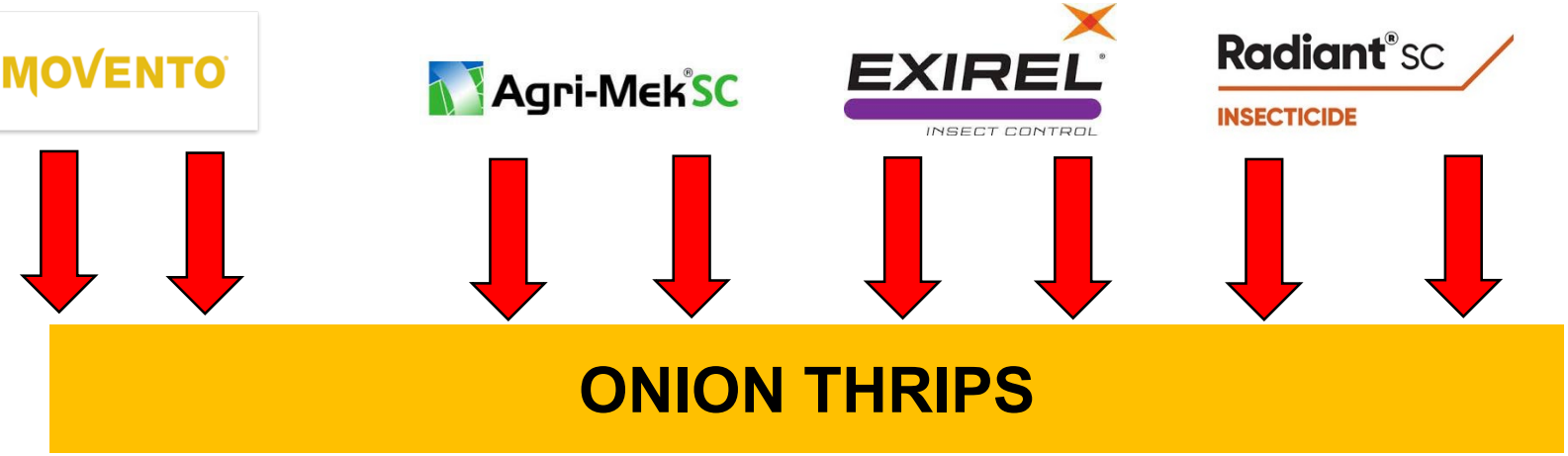
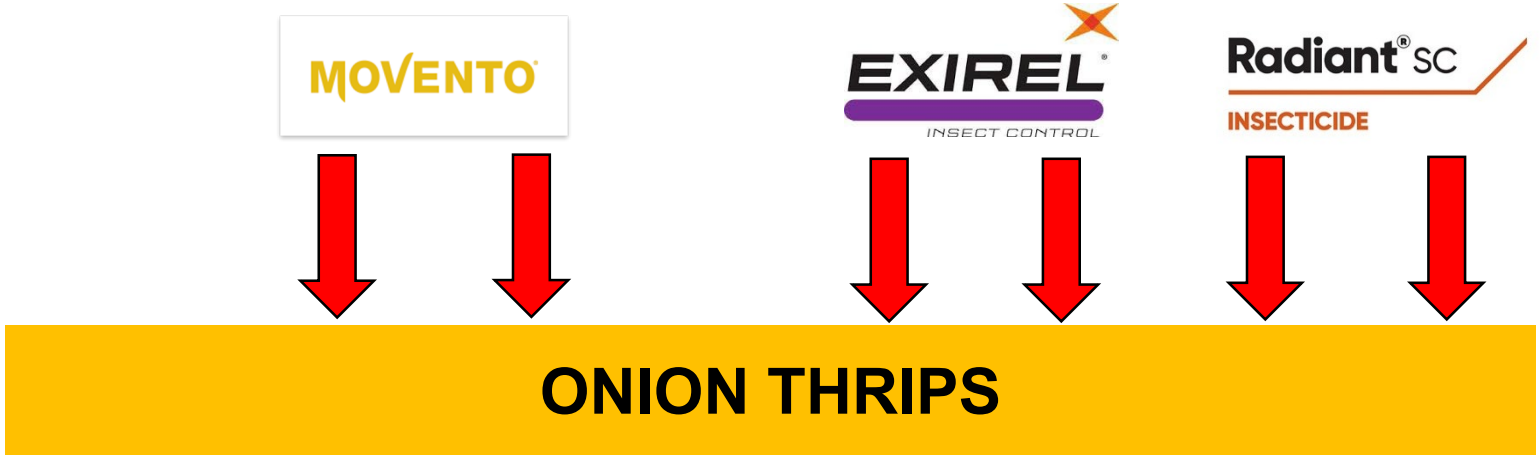


Movento applications beginning with a threshold ~ 1 thrips/leaf?



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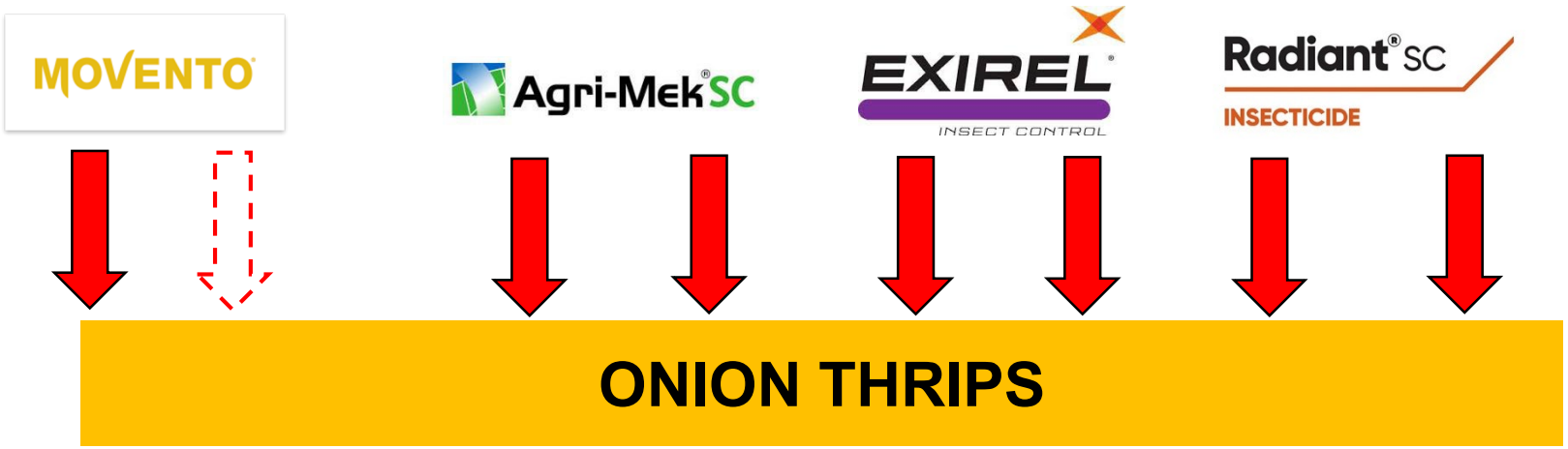

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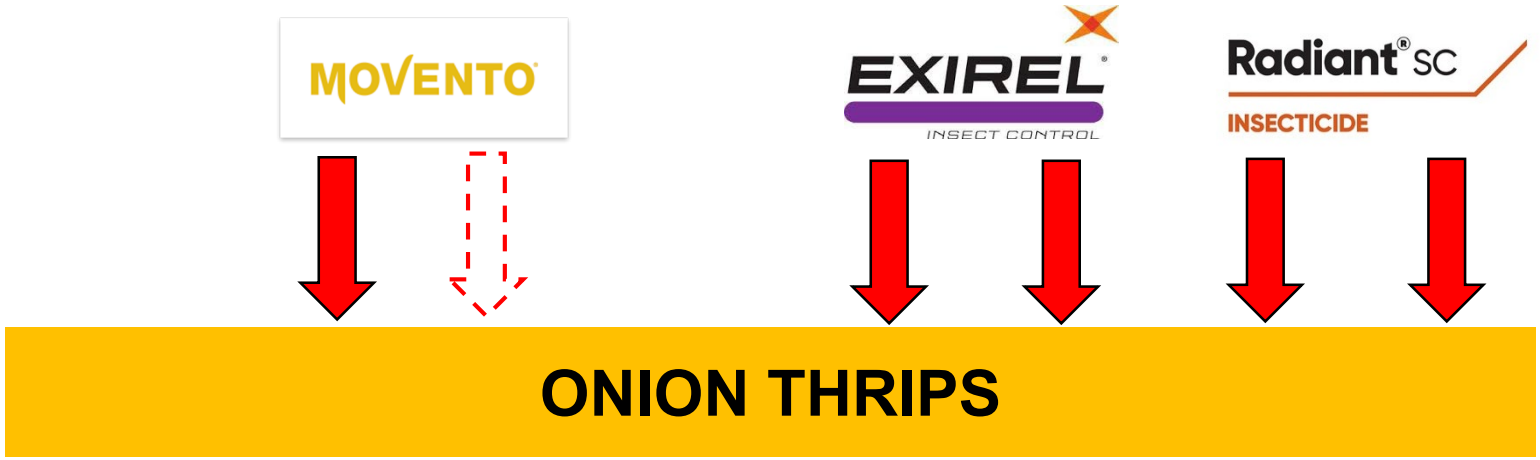

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Evaluation of Movento applied @ two action thresholds either once or twice a week later

Product[a]	Initial Threshold	Number of Sprays
Untreated	-	-
Movento	0.1 larva/leaf	1
Movento	0.1 larva/leaf	2
Movento	1.0 larva/leaf	1
Movento	1.0 larva/leaf	2

[a] Co-applied with Dyne-Amic @ 0.25% v:v

Evaluation of Movento applied @ two action thresholds either once or twice a week later

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Three-year studied showed the following statistical results:

- ✓ **Two applications > one application**

Evaluation of Movento applied @ two action thresholds either once or twice a week later

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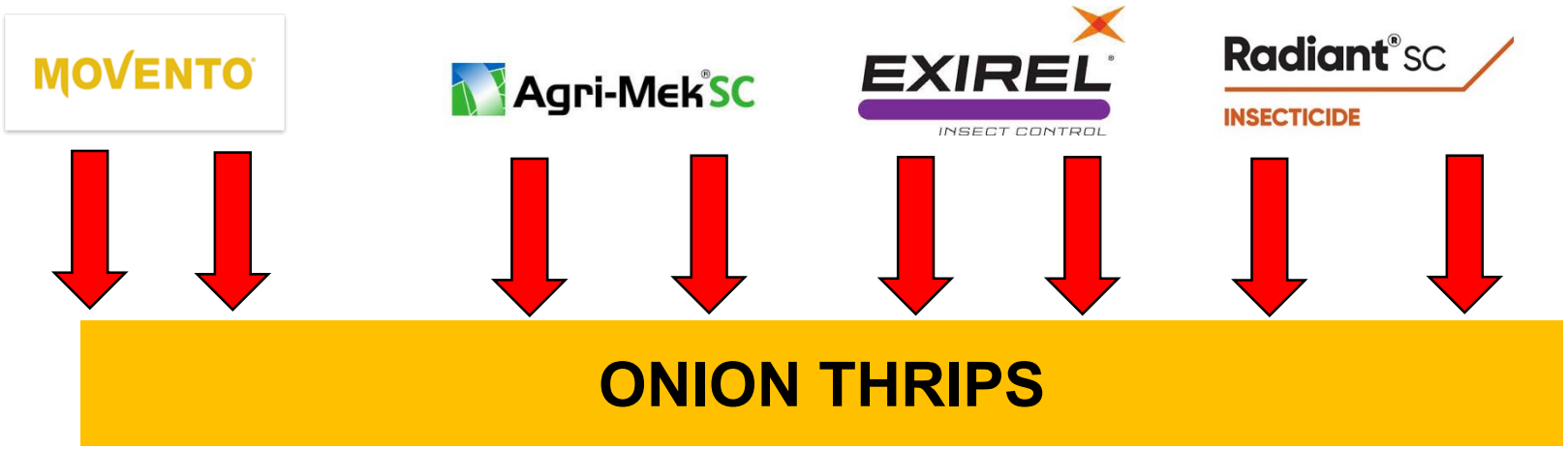
Three-year studied showed the following statistical results:

- ✓ **Two applications > one application**

- ✓ **0.1 thrips/ leaf = 1.0 thrips/ leaf**

  …but, overall fewer thrips on plants following 1 thrips/leaf

Movento applications beginning as soon as thrips are observed?



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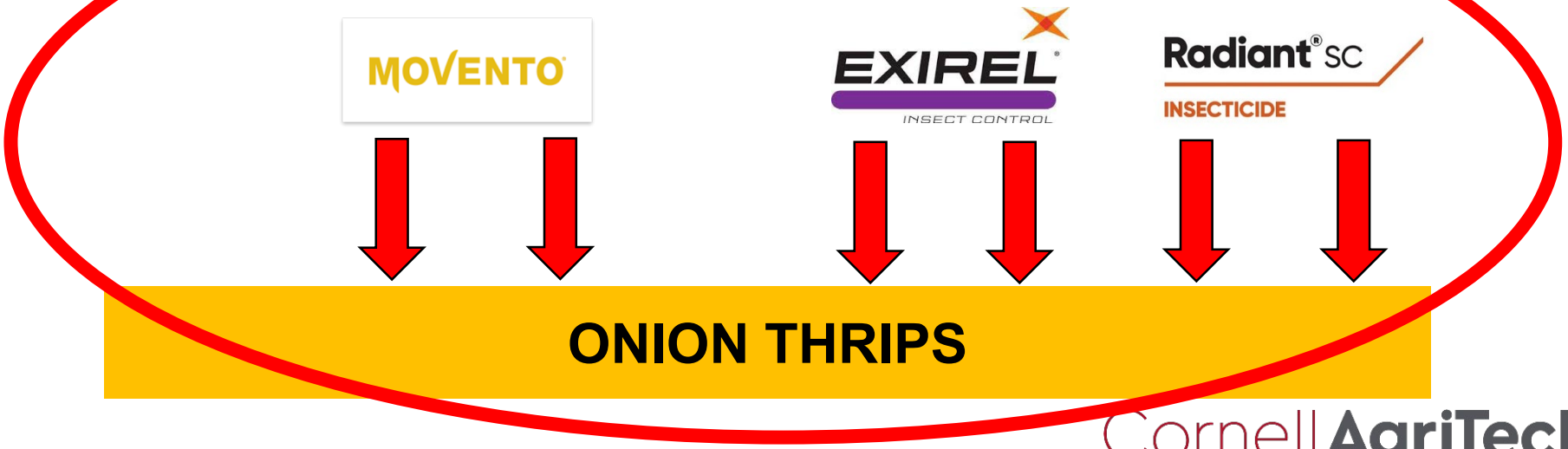

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Question: What is the best threshold for Movento/ Senstar and are 2 sprays needed?

Answer: Apply twice starting with a threshold of ~ 1 thrips/ leaf

Onion thrips management guidelines

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0.6-1 thrips per leaf; prebulbing

Movento or Senstar

↓ 7-10 days

Movento or Senstar

- Assumes 6 insecticide applications total in season
- Assumes action threshold of 1 thrips per leaf, unless specified otherwise

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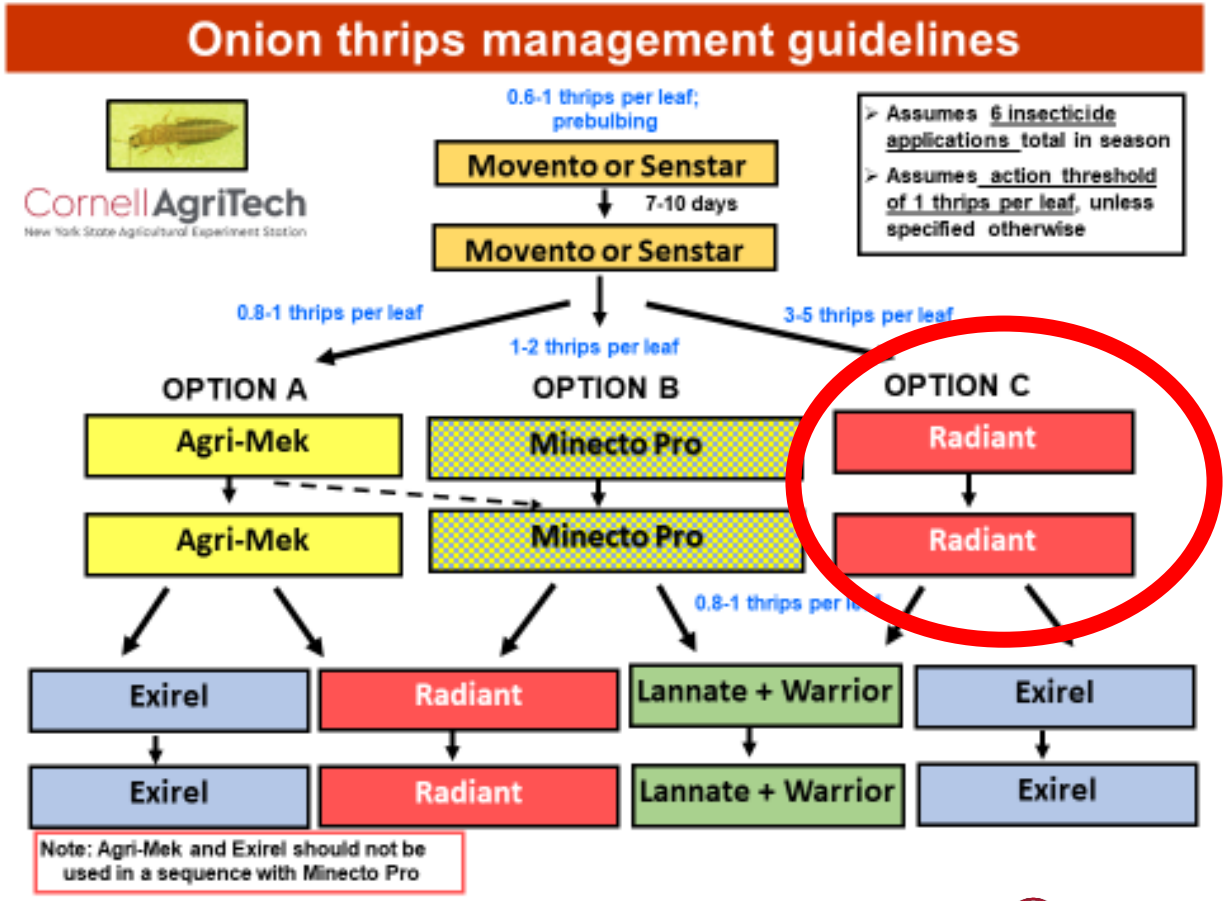
Question: What if Radiant SC is not working as well as in past?



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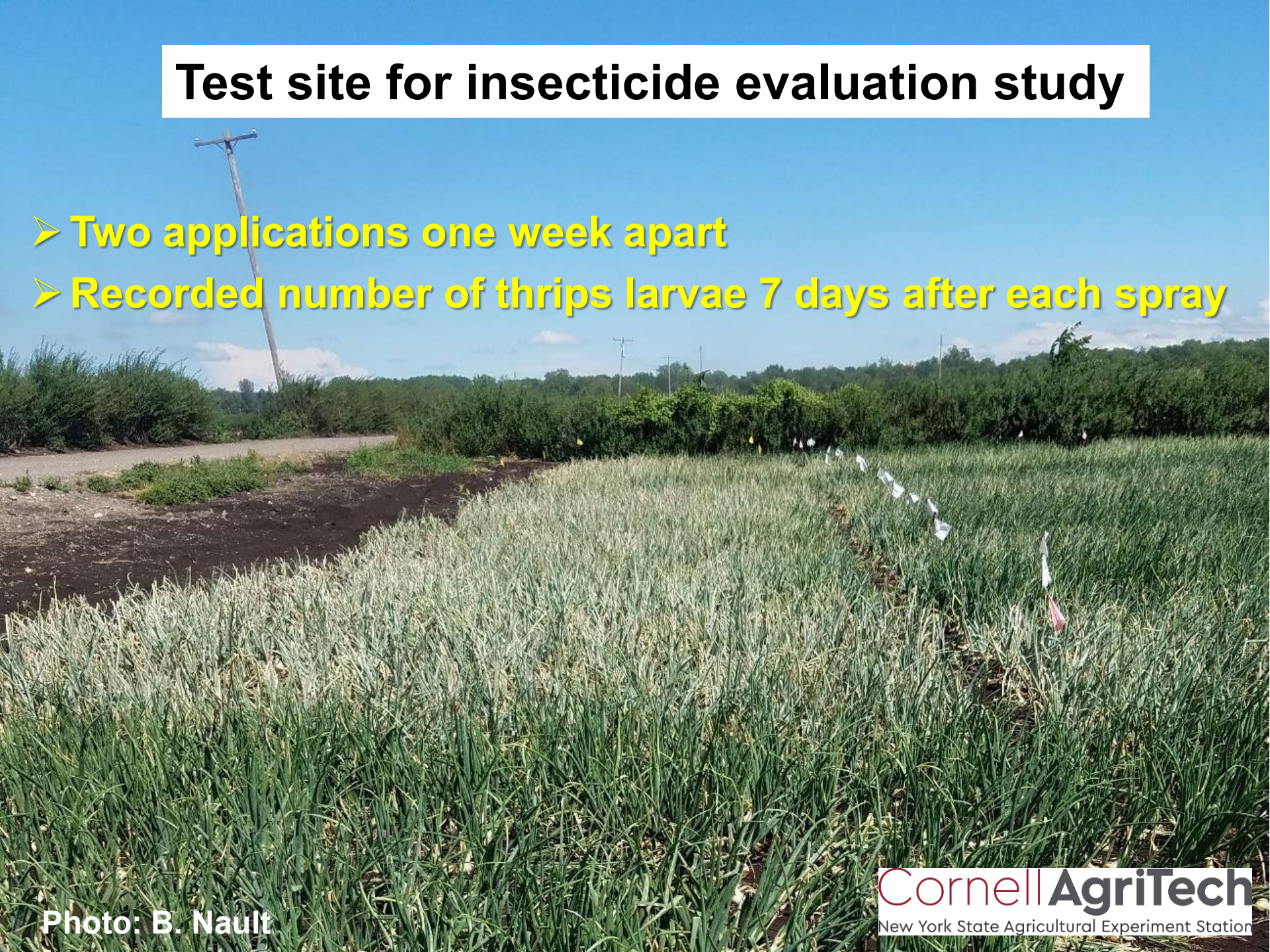
Comparing performance of Radiant SC with Exirel and PLINAZOLIN technology to control thrips

Product	Active ingredient	Rate
Untreated		
Radiant SC	spinetoram	10 fl oz/acre
Exirel	cyantraniliprole	20.5 fl oz/acre
PLINAZOLIN® technology*	isocycloseram	X fl oz/acre

* Syngenta's new product (IRAC 30); possible registration by 2025

Test site for insecticide evaluation study



- Two applications one week apart
- Recorded number of thrips larvae 7 days after each spray

Photo: B. Nault

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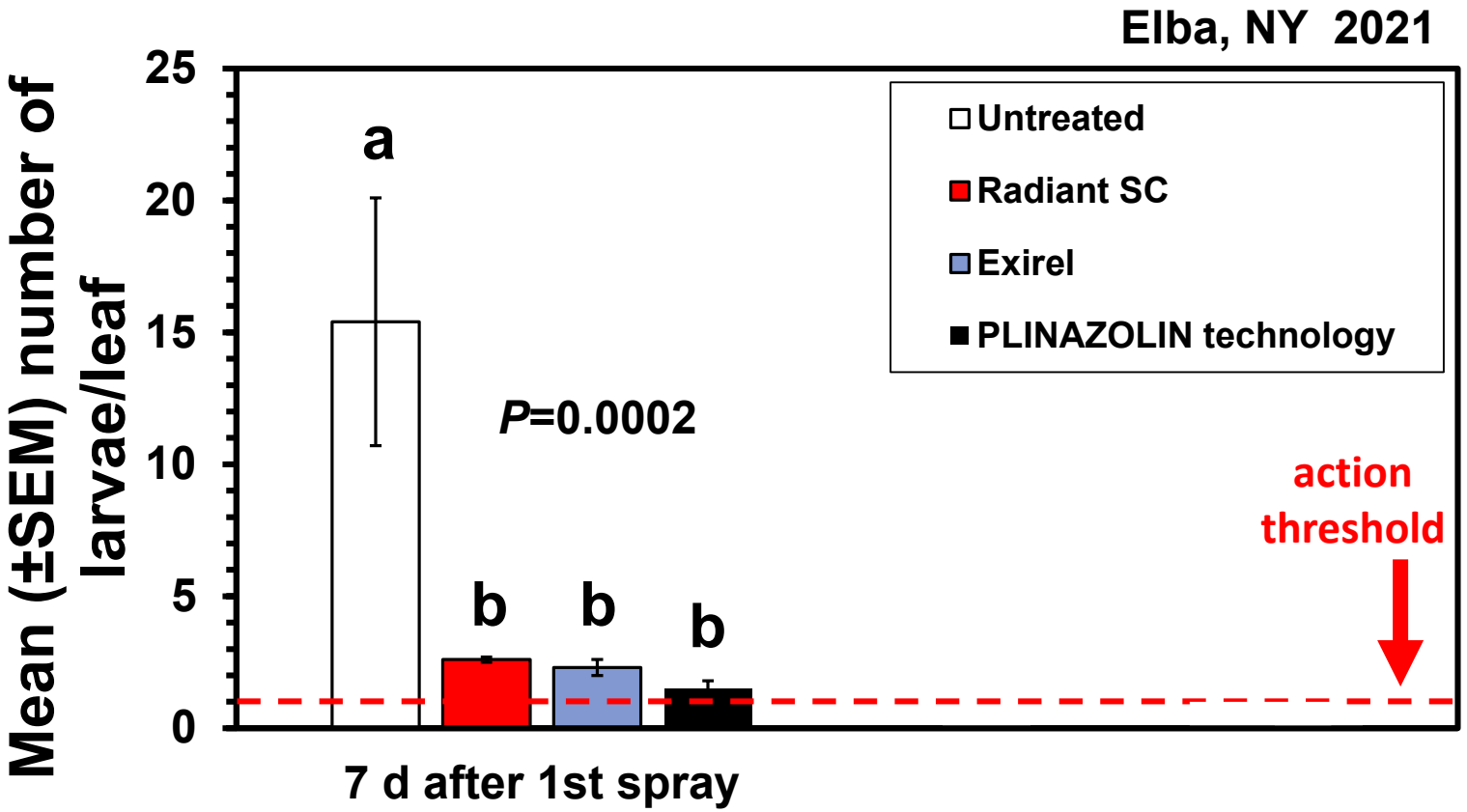
Comparing performance of Radiant SC with Exirel and PLINAZOLIN technology to control thrips



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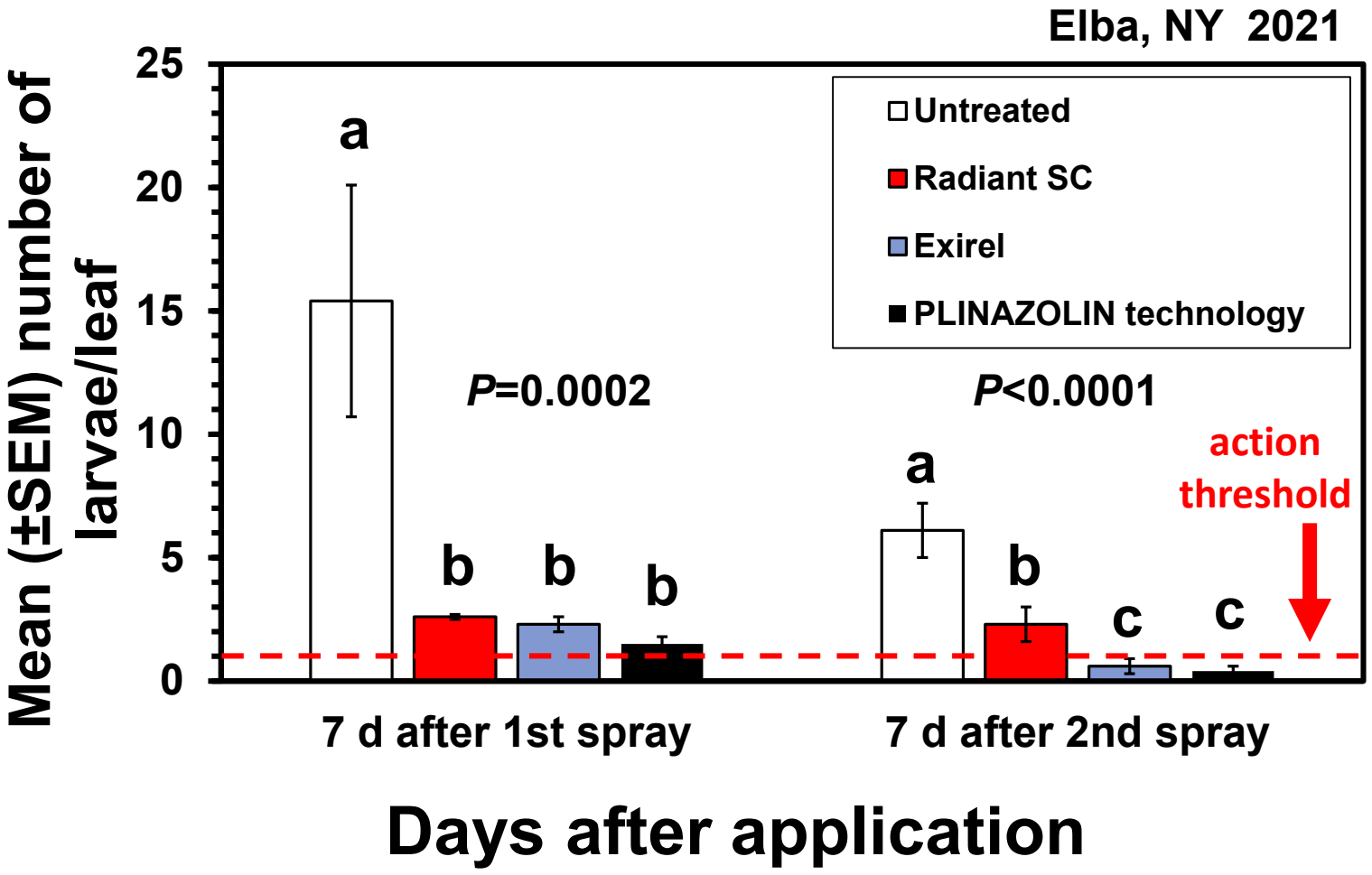

Onion thrips management guidelines

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Movento or Senstar

7-10 days

Movento or Senstar

- Assumes 6 insecticide applications total in season
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0.8-1 thrips per leaf | 1-2 thrips per leaf | 3-5 thrips per leaf

OPTION A	OPTION B	OPTION C
Agri-Mek	Minecto Pro	Exirel
Agri-Mek	Minecto Pro	Exirel

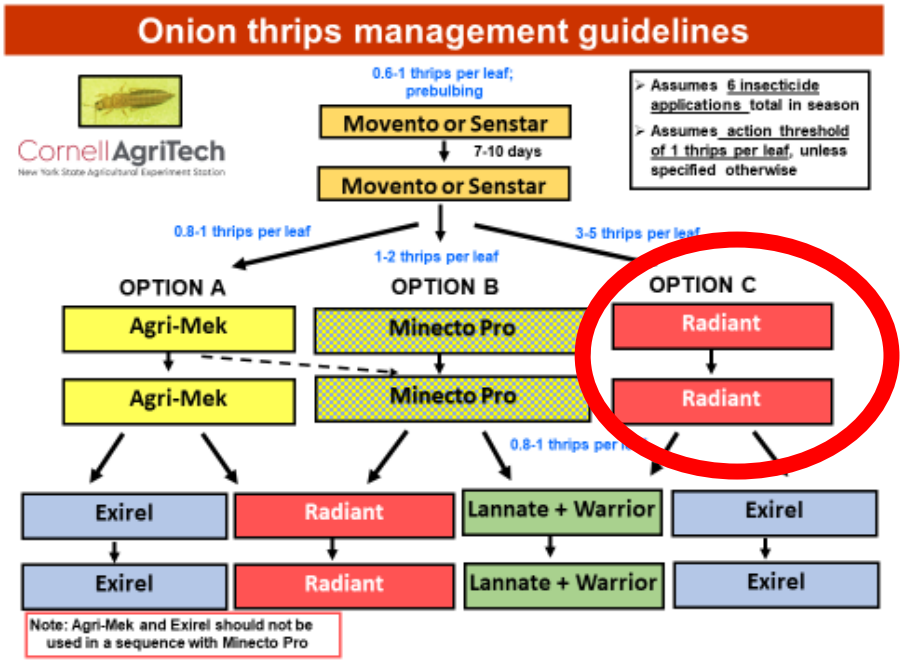
0.8-1 thrips per leaf

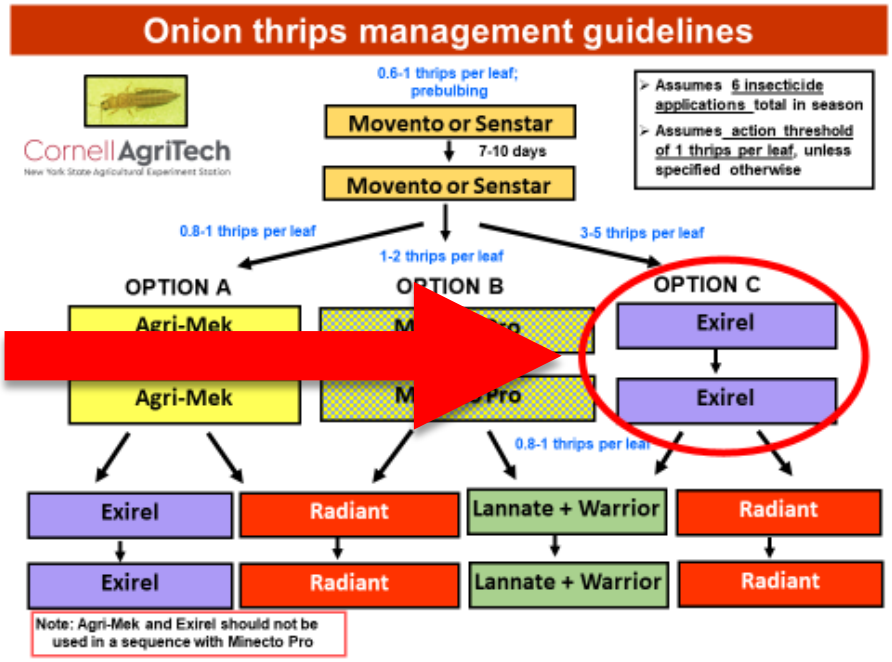
Exirel	Radiant	Lannate + Warrior	Radiant
Exirel	Radiant	Lannate + Warrior	Radiant

Note: Agri-Mek and Exirel should not be used in a sequence with Minecto Pro

Question: What if Radiant SC is not working as well as in past?

Answer: Swap places with Exirel





Summary – Thrips Control

- Consider following the **Onion Thrips Management Guidelines** to optimize control and mitigate resistance
  - Use a sequence of products with each applied no more than twice
  - Use action threshold of ~1 thrips/ leaf to optimize number of sprays

Outline

I. Onion thrips

- Refresher on thrips biology and management
- Advice about using Movento/Senstar and Radiant
- Guidelines for season-long control

II. Onion maggot

- Update on insecticide seed treatments

Maggots, *Delia spp.*

Photo: J. Ogrodnick

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Maggot damage


Onion plants killed by maggots that were not protected
No insecticide
Insecticide
Photo: B. Nault
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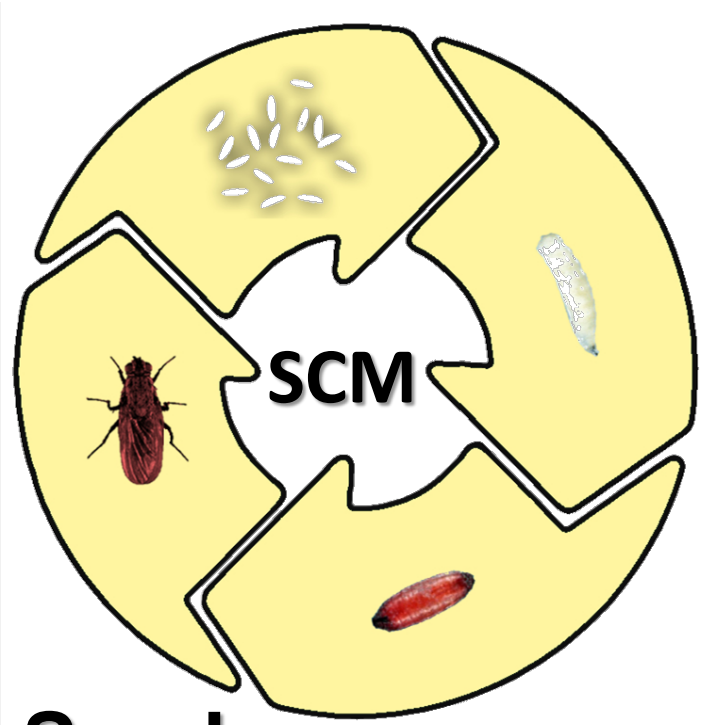
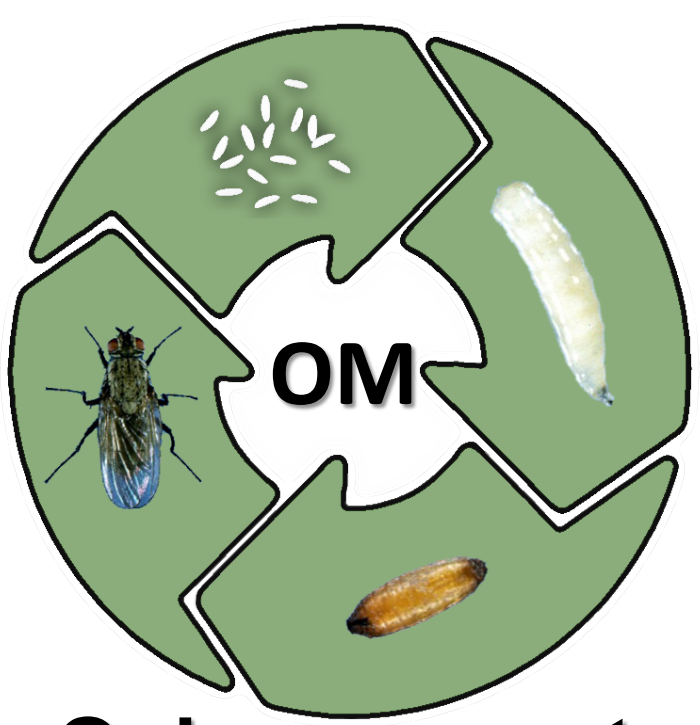
Maggot Complex

Diptera: Anthomyiidae

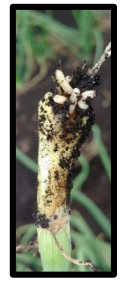


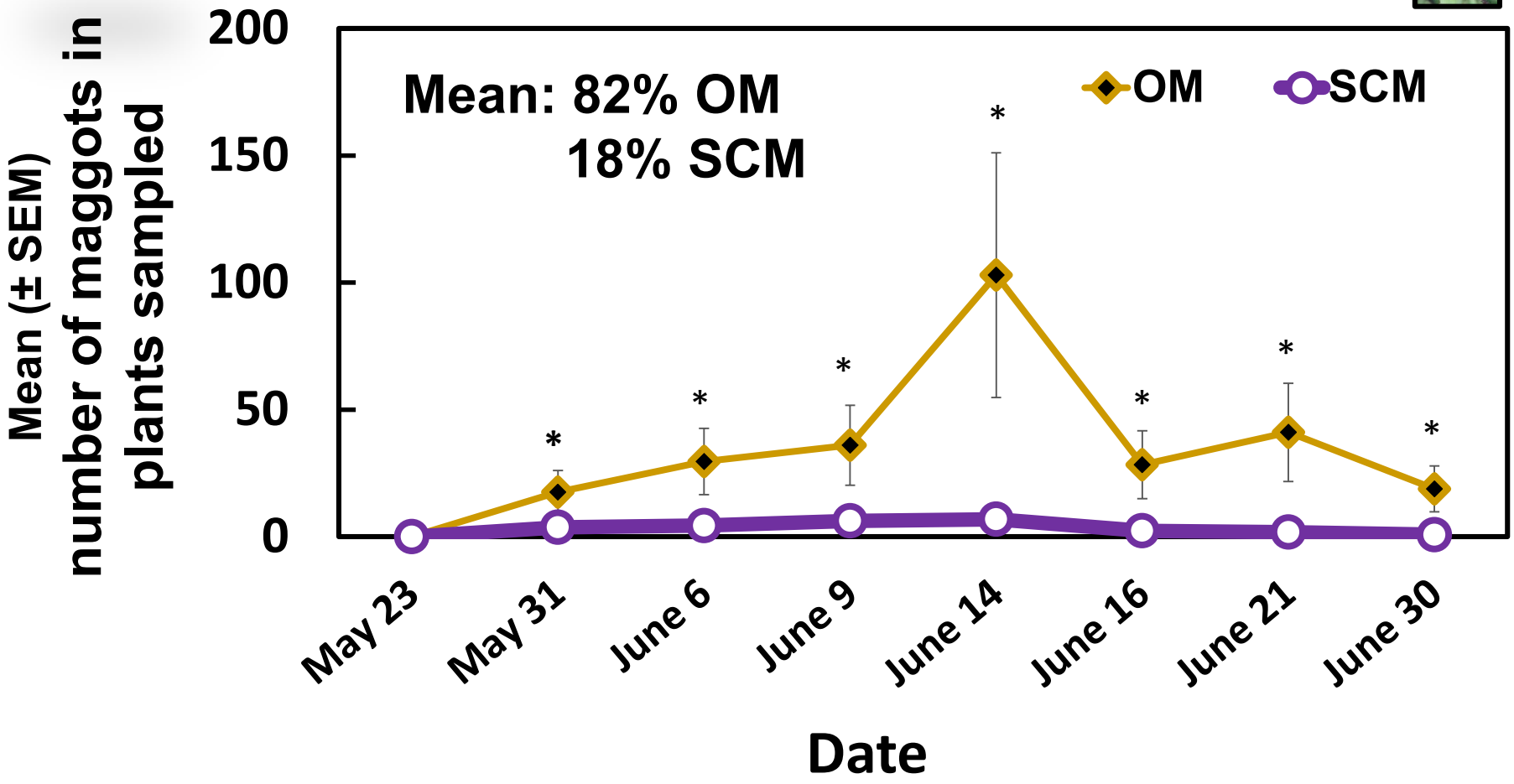
Seedcorn maggot (*Delia platura* Meigen)



Onion maggot (*Delia antiqua* Meigen)

Onion maggot is dominant species infesting plants in NY





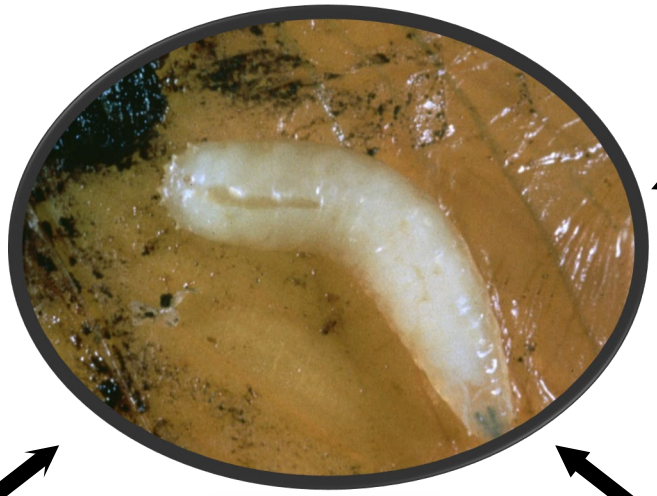
* indicates significant difference between species $P < 0.05$

Salgado & Nault (unpublished)

Management Tactics

1) Chemical control

2) Resistance



5) Behavioral control

3) Cultural control

4) Biological control

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Management Tactics

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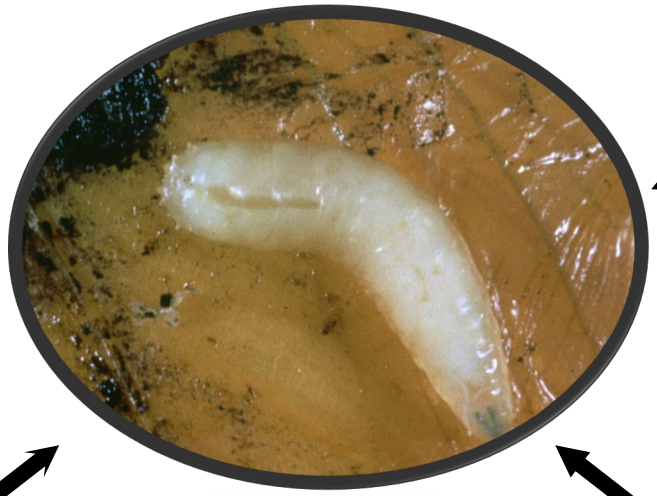
2) Resistance

5) Behavioral control



3) Cultural control

4) Biological control

Insecticides registered for direct-seeded onion for maggot control

Tradename	Active Ingredient(s)	Group	Activity on Target Pests[1]	
Insecticides:		IRAC	**Onion Maggot**	**Seedcorn Maggot**
Regard SC	spinosad	5	**Excellent**	**Excellent**
Trigard OMC	cyromazine	17	**Excellent**	**Fair/ Poor**
Cruiser 70WS	thiamethoxam	4A	**Poor**	**Fair/ Poor**
Sepresto	clothianidin + imidacloprid	4A	**Fair**	**Good/ Fair**

[1]Based on experience by B. Nault & C. Hoepting (Cornell), S. Reitz (Oregon State), T. Waters (Washington State) and R. Wilson (University of California)

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Seed treatment packages growers are using in NY and elsewhere:						
Classic FarMore FI500	=	Regard SC	+	Cruiser 70WS	+	FarMore F300
Alternative FarMore FI500	=	Trigard OMC	+	Cruiser 70WS	+	FarMore F300

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Corteva onion maggot trial (2022). Photo credit: Leonardo Salgado, Cornell University

CORTEVA™ agriscience

- **Active ingredient**: spinosad (same as Regard SC)
- **Formulation:** 80%WP
- **Commercial seed treatment**
- **Registered in CA, WA, NE, ID**
- **Available for 2023!**

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Insecticide resistance management strategy for onion maggot

- **Annually rotate Trigard (cyromazine) and Lumiverd (spinosad) to slow down resistance in onion maggot populations**

FarMore® FI500 Onion	**Alternative with Trigard**

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Summary – Maggot Control

- Lumiverd (spinosad) has replaced Regard (spinosad) for maggot control
- Rotate Lumiverd and Trigard to slow down resistance in onion maggot
- Add Cruiser to Trigard for some seedcorn maggot control

Acknowledgements

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Questions?

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Photo: E. Moretti